MARKET CHAIN ANALYSIS OF TEFF AND WHEAT PRODUCTION IN HALABA SPECIAL WOREDA, SOUTHERN ETHIOPIA

M. Sc. Thesis

MUHAMMED URGESSA

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MARKET CHAIN ANALYSIS OF TEFF AND WHEAT PRODUCTION IN HALABA SPECIAL WOREDA, SOUTHERN ETHIOPIA

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MUHAMMED URGESSA

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HARAMAYA UNIVERSITY

As Thesis Research advisor, I hereby certify that I have read and evaluated this thesis prepared, under my guidance, by Muhammed Urgessa, entitled **Market Chain Analysis of Teff and Wheat production in Halaba Special Woreda, Southern Ethiopia.** I recommend that it be submitted as fulfillment of the Thesis requirement.

_____	_____	_____
Major Advisor	Signature	Date
_____	_____	_____
Co-advisor	Signature	Date

As member of the Board of Examiners of the MSc Thesis Open Defense Examination, We certify that we have read, evaluated the Thesis prepared by Muhammed Urgessa and examined the candidate. We recommended that the Thesis is accepted as fulfilling the Thesis requirement for the Degree of Master of Science in Agriculture (Agricultural Economics).

_____	_____	_____
Chairperson	Signature	Date
_____	_____	_____
Internal Examiner	Signature	Date
_____	_____	_____
External Examiner	Signature	Date

DEDICATION

I dedicated this Thesis manuscript to my beloved mother for the dedication she made in the success of my life.

STATEMENT OF AUTHOR

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Name: Muhammed Urgessa Nuru Signature: ……

Place: Haramaya University, Haramaya

Date of Submission: ……

ACRONYMS

BoARD	Bureau of Agriculture and Rural Development
BoFED	Bureau of Finance and Economic Development
CC	Contingency Coefficient
CSA	Central Statistic Authority
DAP	Di Ammonium Sulphate
ETB	Ethiopian Birr
ENS	Ethiopian Nutritional Survey
FGD	Focus Group Discussion
FTC	Farmers' Training Centre
GDP	Gross Domestic Product
GMM_P	Gross Marketing Margin for producers
GMM_{UR}	Gross Marketing Margin for Urban retailers
GMM_{WS}	Gross Marketing Margin for wholesalers
FAO	Food and Agricultural Organization
ILRI	International Livestock Research Institute
IPMS	Improving Productivity and Market Success
MFI	Micro Finance Institution
NGO	Non Governmental Organization
NRC	National Research Council
OLS	Ordinary Least Square
S-C-P	Structure Conduct and Performance
SNNPR	Southern Nations Nationalities People Region
SPSS	Statistical Package for Social Science
TGMM	Total Gross Marketing Margin
VIF	Variance Inflation Factor
WOARD	Woreda Office of Agriculture and Rural Development

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BIOGRAPHIICAL SKETCH

The author was born on August 1976 in Halaba Qulito and attended his primary and high school education at Alaba Edget and Alaba comprehensive respectively. He joined Hawassa University in 1997 and graduated with B.Sc Degree in Plant Production and Dry land Farming in 2000. Before he joined the school of graduate studies of Haramaya University in 2006, he was serving at Halaba special woreda office of Agriculture and Rural Development as Early Warning and Food Security Expert.

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MARKET CHAIN ANALYSIS OF TEFF AND WHEAT PRODUCTION IN HALABA SPECIAL WOREDA, SOUTHERN ETHIOPIA

ABSTRACT

This research attempted to analyze the market chain of teff and wheat in Halaba with specific objective of assessing the structure-conduct-performance of teff and wheat marketing, the various marketing channels, the institutional support services of extension, input supply, and credit and analyzing the determinants of teff and wheat supply. Primary data were collected from160 teff and wheat producers and 43 grain traders based on two stage random sampling method. Multiple linear regression model was employed to estimate the determinants of teff and wheat supply. The results of the study indicated that out of the total teff and wheat produced by sample farmers, 86.2% of teff and 49.2% of wheat were marketed. Urban assemblers, regional wholesalers and regional retailers bought 40%, 37.4% and 16.5% the teff marketed respectively. Likewise, wholesalers and urban assemblers bought 45.1% and 43.8% of wheat marketed respectively. Alaba Qulito sample market was inefficient, characterized by oligopolistic market structure. The major barrier to enter into the market was shortage of capital. Licensing and years of trading experience did not hinder entry into teff and wheat trading activities. Moreover, the markets were overwhelmed by information asymmetry with low degree of market transparency. Although trading of teff and wheat is profitable across all sample farmers and traders, problems like oligopolistic market structure and information asymmetry made the trading business uncompetitive and inefficient. Among the different variables hypothesized to determine the supply of teff and wheat, econometric result showed that four variables such as quantity produced, access to market information, access to extension service and sex of the household head significantly affected the volume of teff supplied to the market. Moreover, three variables namely quantity produced, access to credit and price of other (pepper) crop significantly affected volume of teff supplied to the market. As hypothesised, all variables took a sign as expected. The study recommends providing policies that improve teff and wheat production capacity by identifying new technologies create stable demand for surplus production would enhance farmers' decision in marketable surplus. Strengthening Institutions that convey reliable and timely market

information required by all market participant. Strengthening the existing extension system through training in a way to serve grassroots level producers in all aspect is important. The number of farmers and traders who accessed credit is very limited; therefore, financial institutions should design a mechanism to address the challenges of financial access to smallholder farmers and traders. Eventually, policies that strengthen the bargaining power of cooperative are vital in order to reduce the market inefficiency created due to oligopolistic nature of market structure.

1. INTRODUCTION

1.1. Background

Cereals are the most important food crop of the world and it provides the world with a majority of its food calories and about half its protein. They are staple foods in the diets of most population. In the year 2007, 2029 million metric tones of cereals was produced globally from 658.5 million hectares of land with an average productivity of 30.83 quintals per hectares (Balasubramanian, 2007). According to FAO (2007), the world cereal production in the year 2007 was increased by 4.8% from previous year production. In the same year Africa's contribution to the world output was 6.35% (about 133.1 million tones).

In Ethiopia, Cereal production and marketing are the means of livelihood for millions of small holder households and it constitutes the single largest sub-sector in economy. Cereal accounts for roughly 60% of rural employment, 80% of total cultivated land, more than 40% of a typical household's food expenditure, and more than 60% of total caloric intake. The contribution of cereals to national income is also large. According to available estimate, cereal production represents about 30% of gross domestic product (GDP). This calculation follows from the fact that agriculture is 48% of the nation's GDP (World Bank, 2007), and that cereals' contribute to agricultural GDP is 65% (Diao *et al*, 2007)

In the country, cereals are also the major stable food crops taking a significant share of area cultivated and volume of production obtained. Out of the total grain crop area, 79.69% (8.7 million hectares) was covered by cereals. Teff and wheat covered up 23.42% (about 2.6 million hectares) and 13.01% (1.4 million hectares) of grain crops area respectively. Cereals also contributed to 85.11% (about 137.1 million quintals) of the total grain production. The contribution of teff and wheat was 18.57% (29.9 million quintals) and 14.36% (23.1 million quintals) of the total Meher cereals produced in the same order (CSA, 2007).

In the SNNPR; agriculture is the backbone of the regional economy; contributing for about 73% of the regional GDP and more than 90% of the total employment (BOFED, 2005). Out of the total land size of the region 112,343.19 square kilometer, about 785,386.5 hectares of land had been used for the production of cereals and the estimated production was 11,172.4 million quintals. The land allocated in the region for the production of teff and wheat in the

year 2007 was 234,790 and 118,815 hectares respectively. Moreover, the regional production of teff and wheat in the year 2007 was 2,322.5 and 1974.6 million quintals respectively (CSA, 2007).

Maize, teff, wheat, sorghum, finger millet and barley are the leading cereals crops grown in the SNNPR. Based on the report of (BOARD, 2007), Hadiya, Guraghe, Kembata Tembaro, Siltie zones and Halaba special woreda are the major cereal producing areas in the region. Although the region has ample production potential and market access, it has never reaped the opportunity as it would supposed to exploit.

Halaba special woreda is one of the nine special woredas in the SNNPR. The woreda is endowed with favorable climatic and natural resource conditions that can grow diverse annual and perennial crops required for household consumption and the market. Despite the fact that, the woreda produces agricultural products based on rain-fed, the presence of two perennial rivers, Billate and Didjo, can boost the production through irrigation. According to WOARD (2004), the major cereals crops grown in the woreda include maize, teff, wheat, sorghum, and finger millet.

Production of teff and wheat by smallholder farmers of the woreda is mainly for market next to red pepper which is the most important and widely known cash crop of the area. The production is mainly subsistence and there are years surplus is produced and also drought years. According to CSA, (2007) the land area covered by teff and wheat in the woreda was 8665.8 and 3564.6 hectares respectively. The woreda produced 93,164.6 and 71,356.7 quintals of teff and wheat respectively. The productivity of teff in the woreda (10.75qts) is slightly lower than the national average (11.67qts) and higher than the regional average. Wheat productivity in the woreda (20.02qts) was much higher than the national (16.75qts) and regional average, 16.62 quintals per hectare.

1.2. Statement of the problem

In Ethiopia, small-scale subsistence farmers dependent on low input, rain-fed mixed farming agriculture dominated with traditional technologies accounts for about 95% of the output (Pender *et al*., 2002). Agricultural production and productivity is very low and the growth in agricultural output has barley kept pace with human population growth.

This small-scale subsistence agriculture remains by far the most important sector in Ethiopian economy and directly supports about 85% of the population in terms of employment and livelihood; contributes about 50% of the country's gross domestic product (GDP); and supplies around 73% of row material requirement of agro-based domestic industries. It is also the major source of food for the population and hence the prime contributing sector to food security. In addition, agriculture is expected to play a key role in generating surplus capital to speed up the country's overall socio-economic development, (Hassen, 2006).

Agricultural marketing is a very important factor in economic development and lack of a well-functioning agricultural market and marketing system severely hinders the increase of social welfare, income distribution, and food security of developing countries. Moreover markets and marketing system do not develop simultaneously with economic growth. Markets and marketing system should be organized deliberately to enable economic development (Wolday, 1994).

Improved information and marketing facility enables farmers to plan their production more in line with market demand, to schedule their harvest at the most profitable time, to decide which market to sell their produce to and negotiate on a more even footing with traders and it also enables traders to move their produce profitably from a surplus to deficit market and to make decisions about the economics of storage, where technically possible. Thus the market information is critical to the law of one price and to the price discovery process (Khols and Uhl, 2002).

Provision of improved and high yielding varieties, chemical fertilizer, pesticides and insecticides may favour the farmer in increasing production; however, this is not an end by

itself. Therefore, Khuls and Uhl, (2002) without modern marketing system, including communications, transportation, storage facilities and financial arrangement this is not possible.

The efforts of increasing agricultural production and productivity have to be accompanied by a well-performing marketing system which satisfies consumer demands with the minimum margin between producers and consumer prices. Higher prices for producer can encourage farmers to adopt new technologies, increase production, (Woldy, 1994). However, there are external and internal problems that influence the marketing efficiency in Ethiopia. This has to do with lack of pertinent market information, development of marketing institutions and marketing infrastructure such as storage, transportation etc.

The possible increment in output resulting from the introduction of improved technology could not be exploited in the absence of well-functioning marketing system. An efficient, integrated, and responsive market mechanism is of critical importance for optimal allocation of resources in agriculture and in stimulating farmers to increase their output (James, 1972, as cited in Andargachew, 1990). A well-functioning marketing system is not limited to stimulation but it also increases production by seeking additional output.

In Ethiopia, agricultural growth induces higher overall growth than non agricultural sectors. This leads to faster poverty reduction since it generates proportionately more income for farm households who represent the bulk of the poor. From within agriculture, staple crops have stronger growth linkage resulting from more than proportionate increase in total GDP. Moreover, such growth linkage becomes stronger overtime (Diao *et al,* 2007).

Supply of agricultural crop in the study area is subjected to seasonal variation where surplus supply at harvest is the main feature. The nature of the product on the one hand and lack of properly functioning marketing system on the other, often resulted in lower producers' price.

Red pepper, teff, wheat and haricot bean are the major cash crops grown in the study area mainly for market. However, marketing aspects of only red pepper and haricot bean were undertaken by Rehima (2007) and Zeleke (2010) while leaving marketing of teff and wheat, which have potential production volume and marketability, unresolved. Moreover there is a

need to employ a market chain approach to fully understand and resolve the problem of teff and wheat at all levels. Yet there is no such study which tries to look into the whole spectrum of marketing chain of these crops and determinants of their supply in Halaba Woreda. This makes the undertaking of market chain analysis of teff and wheat in the Woreda imperative. This study is designed to address the prevailing information gap on the subject and contribute to proper understanding of the challenges and assist in developing improved market development strategies to benefit of smallholder farmers, traders, and other market participants.

1.3. Objectives of the study

The overall objective of this study is to investigate market chain of teff and wheat in Halaba special woreda; the specific objectives of the study are the following;

1. To analyze the institutional support services of extension, input supply and credit in Halaba.
2. To assess the determinants of marketed supply of teff and wheat in the woreda.
3. To study the market structure-conduct- performance of teff and wheat in Halaba.

1.4. Research questions

1. What are the institutional support services given to teff and wheat producers?
2. What are the determinants of marketed supply of teff and wheat in the study area?
3. What is the structure-conduct-performance of teff and wheat in the study area?

1.5. Significance of the study

This study focuses on the determinants of teff and wheat supply, credit condition, marketing margin and identifying opportunities and constrains of teff and wheat production and marketing in Halaba special woreda. The information is expected to assist market participants

to understand the supply potential, and analyze the performance of teff and wheat marketing activities which could serve as a major input to formulate appropriate marketing policies and strategies in Halaba woreda by identifying interventions that improve efficiency of the marketing system. The study can also serve as an additional source to conduct detailed studies by identifying research agenda.

1.6. Scope and limitation of the study

This study was undertaken in Halaba special woreda of SNNPRS. The study emphasized different market levels, role of market actors in the marketing channel, market directions, producers bargaining characteristics, traders buying and selling strategies, storage, transportation, market information, and financial institution involved in the market and determinants affecting supply of teff and wheat in the study area was also seen. The study was restricted to the market chain analysis of teff and wheat production in the above mentioned woreda. In addition, the shortage of logistics and budgets made the researcher unable to consider additional sample of teff and wheat producing kebeles and other neighboring markets found in and out of the study area.

2. LITERATURE REVIEW

2.1. Basic concepts

This section attempts to provide basic definition of a market, marketing, marketing system, identifying the factors affecting the market supply, the approaches and methods of evaluating the efficiency of agricultural markets.

2.1.1. Market

The word "market" has many connotations. Bain and Howells (1988), define "markets" as a single arrangement in which one thing is exchanged for another. A market consists of buyers and sellers with facilities to communicate with each other. It needs not to be specific place (Crammer and Jensen, 1997) or spot market. According to Abbot and Makeham (1981), a market can be defined as an area in which exchange can take place. A market according to kohls and Uhl (2002) is an arena for organizing and facilitating business activities and for answering the basic economic questions: what to produce, how much to produce, how to produce, and how to distribute production.

2.1.2. Marketing

The term marketing has a variety of meanings. To some shoppers it means purchasing groceries and all other household needs. From the point of view of farmer or rancher, it means selling their commodities. From the perspective of handler of the commodity, it means storing the commodity, transporting the product in to a form that consumers want, shipping it to retail outlet and promoting its sale (Crammer and Jensen, 1997).

According to Kotler and Armstrong (2004) defined marketing as a social and managerial process by which individuals and groups obtain what they want and need through creating and exchanging products and value with others. Purcell (1979) forwarded a broader definition i.e. marketing…… (is) the set of economic and behavioral activities that are involved in coordination the various stages of economic activities from production to consumption.

According to Lamb *et al*, (2004) Marketing is the process of planning and executing the consumption pricing, promotion and distribution of idea, goods and services to create exchange that satisfy individual and organizational goals. Marketing is productive because it adds form, time and place utility (or satisfaction).

2.1.3. Marketing system

The concept of marketing system includes both the physical distribution of economic input and products and the mechanism of process or coordinating production and distribution (cited in Andargachew 1990). Branson and Norvel (1983) define the marketing system in terms of what is otherwise known as marketing channel. In broad terms, marketing system may be defined as the totality of product channels, market participants and business activities involved in the physical and economic transfer of goods and services from producers to consumers. Marketing system operates through a set of intermediaries performing useful commercial functions in chain formations all the way from the producer to the final consumers (Islam *et al*., 2001).

2. 1.4. Marketing channel

The term channel is derived from the Latin word canals, which means canal. The marketing channel can be viewed as large canal or pipeline through which products, their ownership, communication, financing and payment, and accompanying risk flow to the consumer (Backman and Davidson, 1962). Formally, a marketing channel is a business structure of interdependent organization that reaches from the point of product origin to consumer with purpose of moving products to their final consumption destination (kotler and Armstrong, 2003).

Marketing channel is the set of interdependence organization that ease the transfer of ownership as products move from producer to consumer (Lamb, *et al*, 2004). Usually marketing follows a fairly well established channel from producers to consumers. Mendoza (1995) defined marketing channel as the path the goods follow from their sources of original production to their ultimate destination for final use. Hence, the analysis of marketing channels is intended to provide a systematic knowledge of the flow of goods and services from their origin (producer) to their final destination (consumer).

Marketing Chain is a term used to describe the numerous links that connect all actors and transactions involved in the movement of agricultural goods from the farm or point of production to consumers or final destinations (CIAT, 2004).

2.1.5 The concept of market efficiency

Marketing efficiency is measured by comparing output and input values. Output values are based on consumer valuation of a good, and input values (costs) are determined by the value of alternative production capabilities (Crammer and Jensen, 1997). In such a case, markets are efficient when the ratio of the value of output to the value of input throughout the marketing system is maximized.

The output of marketing is consumer's satisfaction with the goods and services and the inputs are the various resources of labor, capital and management that marketing firms use in the process accomplishing particular job without reducing consumer's satisfaction with the output of improvement in efficiency (Abbot and makeham 1981, and Lele and Jain, 1997). However, if a reduction in marketing costs, results in reduction in consumer's satisfaction, then the cumulative effect may not bring an improvement in marketing efficiency.

Effective and efficient marketing systems the one that will induce the production of those products and quantities which when sold to the consumer will result in maximum returns after the deduction of minimum marketing charges and farm production costs (Kohls and Uhl, 1995). However, consumer's satisfaction can not be measured directly, changes analyzed in terms of "technical" efficiency and "pricing" efficiency.

Technical efficiency: it is concerned with the manner in which physical marketing functions are performed to achieve maximum output per unit of input. Technological changes can be evaluated to determine whether they will reduce marketing costs per unit of output. New methods of packaging and processing, for example may reduce waste and prevent deterioration in quality (Abbot and Makeham, 1981)

Pricing efficiency: pricing efficiency is concerned with the accuracy, precision, and speed with which prices reflect consumers' demand and are passed back through the market channels to producer. Pricing efficiency is, thus, affected by rigidity or marketing costs and

the nature and degree of competition in the industry. Activities that may improve pricing efficiency are improvement of market news and information and competition (Crammer and Jenson, 1982). The objective of price efficiency is to improve the operation of buying, selling and pricing aspect of the marketing process, so that it will remain responsive to consumer's preference (kohls and Uhl, 1985).

2.2 Factors affecting market supply

The market supply refers to the amount actually taken to the markets irrespective of the needs for home consumption and other requirements. Whereas, the marketed surplus is the residual with the producer after meeting the requirement of seed, payment in kind, and consumption by farmer (Wolday, 1994).

An important aspect of supply chain is that they consist of some associated but distinct flows. One is the physical flow of the commodity and another is flow of money realized from final sale back to the producer and all the enterprises that have been involved in processing and marketing. The efficiency and effectiveness of the practices and procedures that govern this latter flow are as important as technical efficiency with which the commodity is produced, processed and marketed (Westlake, 2005).

Marketing of agricultural products consists primarily of moving products from production sites to points of final consumption. In this regard, the market performs exchange functions as well as physical and facilitating functions. The exchange function involves buying, selling and pricing. Transportation, product transformation and storage are physical functions, while financing, risk-bearing and marketing information facilitate marketing

A number of studies investigated about factors that mainly affect marketable supply of agricultural commodities. The main factors which determine market supply could be divided into economic factors which include product price, provision of consumer goods, production cost and market supply costs and political factors which include the level of government intervention (Maro, 1986; cited in Wolday, 1994). One of the expected important variables which influence the behavior of the market supply of producers is price. If price increases,

producers will gain high revenue and would be motivated to increase the market supply (Wolday, 1994).

Bellemare and Barrett (2006) estimated factors affecting sell of animals in Kenya and Ethiopia. They observed that the net purchase and net sales volume choices depend on expected market participation. The household head sex (female headed), age, family size, herd size, female TLUs, encumbered males, and small stock (sheep and goat) had significant and negative influence on number of animals sold. Unlikely, assets, land holding, other income, encumbered females, and average price of larger stock (camels and cattle) had correlated positively with number of animals sold.

A study made in Alaba Siraro district by Wolday (1994), pointed out the major factors that influenced the marketable supply of teff, maize and wheat at Alaba Siraro district using cross sectional data and he investigated the relationship of farm level marketable supply of cereals to capture the influence of the independent variables on the marketable supply of food grain, he adopted multiple regression analysis with both dummy and continuous variables as explanatory variables. He identified that size of output (teff, maize and wheat) significantly and positively affected teff, maize and wheat supplied. On the other hand, access to market significantly and negatively affected volume of sale of teff and maize. Poor accesses to the market negatively affected maize sold while positively affected teff and wheat sold. Family size also significantly and positively affected quantity supplied of teff and wheat while it negatively affected quantity supplied of maize.

Another study by Wolelaw (2005) find out the major factors that affect the marketable supply of rice at Fogera district using multiple linear regression model. He investigated the relationship between the determinant factors of supply and the marketable supply of rice and her study revealed that the current price, lagged price, amount of rice production at farm level and consumption at household level had influenced marketable supply of rice at the district.

Similar study undertaken by Kinde (2007) indicated that, the major factors that affect marketable supply of sesame in Metema district by using cross-sectional data with dummy and continuous explanatory variables. In his study he implemented multiple linear regression model to identify the relationship between the marketable supply of sesame and the

hypothesized explanatory variables, hence his study acknowledged that amount of sesame productivity, use of modern inputs, number of language spoken by the household head, number of oxen owned, sesame area and time of selling of sesame influenced marketable supply of sesame positively. Another related study by Rehima (2006) identified that the key factors that affecting marketable supply of red pepper at Alaba and Siltie districts of SNNPRS using cross-sectional data with both dummy and continuous independent variables. In her study, she employed Tobit model and came up with the finding that distance to the market, frequency of contacts with extension agents, quantity of pepper produced and access to market information influenced marketable supply of pepper positively at the district. Recent studies are commonly using regression models to estimate the supply function.

2.3 Approaches to study marketing problems

The study of marketing involves various approaches. These include; the functional approach, the system or institutional approach and the individual or commodity approach (Mendoza, 1995; Branson and Norvell, 1983).

2.3.1 Functional approach

In this approach we took all the basic marketing activities (functions) that have to be performed in the agricultural commodities and at the marketing of inputs in to agricultural production. Functional approach studies marketing in terms of the various activities that are performed in getting farm product from the producer to the consumer. These activities are called *functions* (Crammers and Jensen, 1997).

Physical distribution (i.e. functions) and economic activity (i.e. buying, selling) are two dimensions of marketing carried out by institutions or people. An analysis of these two dimensions of agricultural marketing is intimately linked to the institutions created by law or by corporate standards or simply by established procedure, that have emerged as a result of the social and economic relation between the participants in the marketing process (middlemen, consumers, and producers).

And this approach helps to compare cost and benefits of different functions. The widely accepted functions are: a) exchange (buying and selling), b) physical (processing, storage, and transportation), and c) facilitating (standardization, financing, risk bearing, and market information). Most of these functions are performed in the marketing of nearly all commodities.

2.3.2 The institutional (system) approach

Institutional approach examines the activities of business organizations or people in marketing. The institutional approach focuses on the study of the various institutions, which perform the marketing activities. These organizations or people are middlemen who perform the operations necessary to transfer goods from the producer to consumer, because of the benefit of specialization and scale that exist in marketing as well as production (Cramer and Jensen, 1982).

2.3.3 Commodity (individual) approach

In a commodity approach, a specific commodity or groups of commodities are taken and the functions and institutions involved in the marketing process are analyzed. This approach focuses on what is being done to the product after its transfer from its original production place to the consumer (Kohls and Uhl, 1985). It helps to pinpoint the specific marketing problems of each commodity as well as improvement measures. The approach follows the commodity along the path between producer and consumer and is concerned with describing what is done and how the commodity could be handled more efficiently. This approach has been used in this study as a guideline to identify different aspects of the problem.

2.4. Market Structure, Conduct and Performance Analysis (S-C-P)

The development of stable and reliable marketing system has been an important element in commercialization and specialization in the agricultural sector. To study how markets are functioning, many researchers used the approach known as Structure-Conduct-Performance (S-C-P) approach.

The structure conduct performance (S-C-P) approach was developed in the United States as a tool to analyze the market organization of the industrial sector and it was later applied to assess the agricultural marketing system. It was designed by Madson in pioneering works in 1939 and followed by Brain, Clerk, Claves, and Scherer (Redi, 1987; cited in Wolday, 1994).

Abbot and Makeham (1981) indicated that factors accounting for efficiency can be evaluated by examining enterprises for structure, conduct and performance. These elements measure the extent of deviation from the perfectly competitive norm. The larger the deviation, the more imperfectly competitive is the market, that is on extreme case would be monopoly.

One important approach to the study of market performance, namely the study of market organization or market structure analysis, suggests that relationship exists between structural characteristics of a market and competitive behavior of market participants and that their behavior intern influences the performance of the market (Scarborough and Kydd 1992; Scott,1995 cited in Gebremeskel *et al.,*1998). Subsequently, the Structural-Conduct-Performance approach was applied in the functioning of markets in the agricultural sectors, and served as a tool to evaluate the performance of the commercial system. The approach comprises of three related levels; the structure of the market, the conduct of the market, and the performance of the market.

Among the major structural characteristics of a market is the degree of concentration, that is, the number of market participants and their size distribution; the relative ease or difficulty for market participants to secure an entry into the market. Market conduct refers to the behavior of firms or the strategy they use with respect to, for example, pricing, buying, selling, etc., which may take the form of informal cooperation or collusion (Gebremeskel, *et al.,* 1998).

2.4.1 The structure of the market

Market structure is defined as characteristics of the organization of a market which seems to influence strategically the nature of competition by pricing behavior with in the market (Bain, 1968; cited in Scott, 1995).Market structure is the description of the number and nature of participants in a market .(Cramer and Jenson ,1982 and Abbott and Makeham ,1981). Structural characteristics may be used as a basis for classifying markets. Markets may be perfectly competitive, monopolistic, or oligopolistic (Scott, 1995).

The four salient aspects of market structures include the degree of seller concentration, the degree of buyer concentration, the degree of product differentiation, and the condition of entry (Koch, 1980, cited in Scott, 1995).

(a) Degree of buyers and sellers concentration;-refers to the number and size distribution of buyers and sellers in the market. According to Khuls and Uhl (2004), market concentration, the portion of the industry sales made by the largest firms, is another source of imperfect competition. Successful competitors frequently eliminate their rivals or discourage new firms entry, contributing to more concentrated market. In general, the higher the level of market concentration, the less perfectly competitive the market is. The common methods of measuring market concentration are the following.

(i) Market concentration ratio (c)

$$C = \sum_{1}^{n} S_i \quad \text{---------- (1)}$$

i= 1, 2, 3……. N

Where S_i =the percentage market share of ith firm and n =the number of largest firms for which the ratio is going to be calculated. Very recently the concentration ratio was the numerical index most widely used by industrial organizations for measuring the size of distribution of firms in market (Shughart, 1990; cited in Admasu, 1998).While it is possible use any economic variable such as employment, total assets or value added, for calculating C, sales or purchase figures have been the most popular basis for the index (Admasu, 1998).Kohls and Uhl (1985) suggested that as a rule of thumb, four largest enterprises concentration ratio of 50 percent or more is an indication of a strongly oligopolistic industry, 33 to 50 percent a weak oligopoly, and less than that, an unconcentrated industry. The problem associated with this index is the arbitrary selection of n (the number of firms that are taken to calculate the ratio).The ratio does not indicate the size distribution of the n firms.

(ii) Hirschman Herfindahi Index (HHI):

$$HHI = \sum_{1}^{n} S_i^2 \quad \text{(2)}$$

, i =1, 2, 3, ----, n

Where S_i, is the percentage market share of ith firm, and n is total number of firms. This index takes into account all points on the concentration curve. It also considers the number and size distribution of all firms. In addition, squaring the individual market shares gives more weight to the shares of the largest firms which is an advantage over concentration ratio. A very small index indicates the percentage of many firms of comparable size, whilst an index of one or near one suggest that the number of firms in small and /or that they have very unequal shares in the market (Scarborough and Kydd, 1992; cited in Admasu, 1998).This method is limited in its application for it imposes additional burden in so far as more data must be collected (Admasu, 1998). In this study the researcher will use market concentration ratio method.

(b) Condition of entry: refers to the relative ease or difficulty with which new dealers in to the market.

(C) Degree of product differentiation: refers to the extent to which competing products in a market are differentiated is expected to influence the competitive interrelationship of sellers in the market.

2.4.2. Conduct of the market

The structure and the conduct of market participants have a direct implication for the nature of production price relationships between different marketing levels and the direction of causality.

Conduct of the market refers to the strategies that firms pursue with regard to price, product and promotions, and the linkages/relationships between and among firms. The market behavior of firms will determine whether or not they compete and whether they are acting innovatively to improve market efficiency. Informal association between even a small numbers of firms (collusion) can cause price distortions, and seemingly independent firms can have joint ownership (subsidiaries).

Market conduct refers to the practices or strategies of traders in maximizing their profits. Among these practices are the use of regular partners, long-term relations with clients, and suppliers, the use of intermediaries, and trade within personalized networks (Wolday, 1994)

Market conduct deals with the behavior of firms that are price-searchers are expected to act differently than those in a price-taker type of industry (Cramers and Jensen, 1982). Price searchers can determine their selling prices or quantity of output they sell. In addition, they could use their market power to weaken or eliminate competitors example reducing price.

According to Abbott and Makeham (1981) conduct refers to the market behavior of all firms. In what way do they compete? Are they looking for new techniques and do they apply them as practicable? Are they looking for new investment opportunities, or are they disinvesting and transferring funds elsewhere? Meijer (1994) said that, "conduct is pattern of behavior which enterprises follow in adopting or adjusting to the market in which they sell or buy", in other words the strategies of the actors operating in the market.

There are no agreed upon procedures for analyzing the elements of market conduct. Rather, previous researchers' point to some guide lines in the form of questions. These questions provide a systematic way to detect indications of unfair price setting practice and the condition under which such practice are likely to prevail. More specifically, they cover the following topics: the existence of formal and informal marketing groups that perpetuate such practice; formal and informal producer groups that affect bargaining power; the availability of price information and its impact on prevailing price; the distance from the major market and its impact on price; and the feasibility of utilizing alternative market outlets. The questions also provide an indication of the type of data needed and data collection procedures (Scott, 1995).

2.4.3 Performance of the market

Performance of the market is reflection of the impact of structure and conduct on product price, costs and the volume and quality of output (Cramers and Jensen, 1982). If the market structure in an industry resembles monopoly rather than pure competition, then one expects poor market performance.

Market performance refers to the impact of structure and conduct as a measured in terms of variables such as prices, costs, and volume of output (Bressler and king, 1970; cited in Scott, 1995). By analyzing the level of marketing margin and their cost components, it is possible to

evaluate the impact of the structure and conduct characteristic on market performance (Bain 1968; cited in Scott, 1995). As a method for analysis the S-C-P paradigm postulates that the relationship exists between the three levels distinguished. One can imagine a causal relations starting from the structure, which determine the conduct, which together determine the performance (technological progressiveness, growth orientation of marketing firms, efficiency of resource use, and product improvement and maximum market services at the least possible cost) of agricultural marketing system in developing countries (Meijer, 1994).

Here, the researcher used the structure-conduct-performance (SCP) approach to analyze the teff and wheat market performance of Halaba special woreda.

2.5 Methods of Evaluating Market performance

Market performance can be evaluated by analysis of costs and margins of marketing agents in different channels, and market integration. A commonly used measure of system performance is the marketing margin or price spread. Margin or spreads can be useful descriptive statistics if used to show how the consumer's food price is divided among participants at different levels of the marketing system (Getachew, 2002).

2.5.1 Marketing costs and margins

Marketing costs: Marketing costs refers to those costs, which are incurred to perform various marketing activities in the shipment of goods from producers to consumers. Marketing cost includes: Handling cost (packing and unpacking, loading and unloading putting inshore and taken out again), transport cost, product loss (particularly for perishable fruits and vegetable), storage costs, processing cost, capital cost (interest on loan), market fees, commission and unofficial payments (Heltberg and Tarp, 2001).

Marketing margin: A marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product. In other words it is the difference between retail price and farm price (Cramers and Jensen, 1982). A wide margin means usually high prices to consumers and low prices to

producers. The total marketing margin may be subdivided into different components: all the costs of marketing services and the profit margins or net returns. The marketing margin in an imperfect market is likely to be higher than that in a competitive market because of the expected abnormal profit. But marketing margins can also be high, even in competitive market due to high real market cost (Wolday, 1994).

There are three methods used in estimating marketing margin (Abbot, 1958): (a) following specific lots of consignments through the marketing system and assessing the cost involved at each of the different stages (time lag); (b) submission of average gross purchase by the number of units transacted for each type of marketing agency; and (c) comparison of prices at different levels of marketing over the same period of time (concurrent method). Because the first two methods are time consuming, in this study the third method will be used.

2.5.2 Market integration

Distortions introduced by governments are in the form of policies either at the border, or as price support mechanisms that weaken the link between the international and domestic markets. Agricultural policy instruments such as import tariffs, tariff rate quotas, and export subsidies or taxes, intervention mechanisms, as well as exchange rate policies insulate the domestic markets and hinder the full transmission of international price signals by affecting the excess demand or supply schedules of domestic commodity markets (Baffes and Ajwad, 2001; Abdulai, 2000). Apart from policies, domestic markets can also be partly insulated by large marketing margins that arise due to high transfer costs. High transfer costs and marketing margins hinder the transmission of price signals, as they may prohibit arbitrage (Sexton *et al*., 1991).

Price transmission studies are apparently empirical that test the predictions of economic theories and provide important insights as to how changes in one market are transmitted to another, thus reflecting the degree of market integration, as well as the extent to which markets function efficiently (Rapsomanikis *et. al.* 2003).

Producer marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movements

(Goodwin and Schroeder, 1991). For developing countries, there are some additional cases to be made for well-integrated market systems. Linkages to marketing centers have been found to contribute significantly to rural household's escape from of poverty (Kishana, 2004; Kishana, *et al*., 2004). Furthermore, the existence, extent, and persistence of famines in market economies is also closely linked to market integration.

3. RESEARCH METHODOLOGY

3.1. Description of the study area

Halaba woreda is located 315 km south of Addis Ababa and about 85 km southwest of the Southern Nations Nationalities and Peoples Regional (SNNPR) State capital of Hawasa. The woreda is geographically located 70 17' N latitude and 38006' E longitude. It is located west of Oromiya region, north of Hadiya (Sike), east of Kembata Tembaro, south east of Silte and Hadiya zones. It is a special woreda and has a special status where the administration directly reports to the regional state. There are 73 peasant and 2 urban associations (IPMS, 2005).

According to the recent woreda population reports (2004/05), the total number of rural households in 73 peasant associations (PA) in the woreda is 35,719. Out of these, 26,698 (75%) are men and 9,021 (25%) are women households. The total woreda population is 210,243, out of which 104,517 (49.7%) are male and 105,726 (50.3%) are female. Economically active population of the woreda (15-55 years of age), are 102,176 people out of which, 55,668 are male and 46,508 are female. Ethnically, there are about 6 major groups in the woreda, but Halaba and Guraghe ethnic groups are the dominant groups constituting about 81 and 10 % of the total population, respectively.(IPMS , 2005)

Altitudinally, the woreda ranges from 1554 to 2149 m above seas level (MASL), but most of the woreda is found at about 1800 MASL. Except for few hills, the woreda has an agriculturally suitable land in terms of topography. Despite the recurrent drought, flood has also been a major problem in the area. The latter is induced as a result of dominantly level topography.

Rainfall is a major limiting factor in agricultural production in the area. As a result, it is one of the woredas in SNNPR where drought is observed recurrently affecting many households. Agro ecologically, the woreda is classified as Weina Dega. The annual rainfall varies from 857 to 1085 mm, while the annual mean temperatures also vary from 17 ^{O}C to 20 ^{0}C with mean value of 18 ^{O}C. The area receives a bimodal rainfall where the small rains are between March and April while the main rains are from July to September. The reliability of the small rains is low that farmers do not or mainly raise pepper seedling to be transplanted during the

main rains. However, during the main rains, all crops grown in the area are planted, including maize, teff, wheat, pepper, haricot bean, sorghum and millet. Rainfall during the main rains is erratic that most of the time crops fail due to uneven distribution of rainfall over the growing period. That is why the woreda faces crop failures almost every 3 years. The soils of the area are believed to be relatively fertile and during good rains farmers can harvest good yield even without fertilizer application. (IPMS, 2005)

The total land area of woreda is 64,116.25 ha of which 48,337 ha (75%) are considered suitable for agriculture (Table 1).

Table1. Land Use type of the woreda

No	Land Use	Area coverage (ha)
1	Arable land	44,020.00
2	Grazing land	4,316.95
3	Forest	4,592.00
4	Potentially cultivable	3,644.50
5	Uncultivable land (hills)	2,805.00
6	Others	4,737.80
7	Total	64,116.25

Source: Alaba Special Woreda Rural Development C.O. (2003/4)

Mixed agriculture is the main activity and plays important role in the woreda. At Halaba, maize, teff, pepper, sorghum, wheat, haricot bean, finger millet and barley are the major annual crops grown by the majority of farmers. Pepper, haricot bean, teff and wheat are also marketable crops.

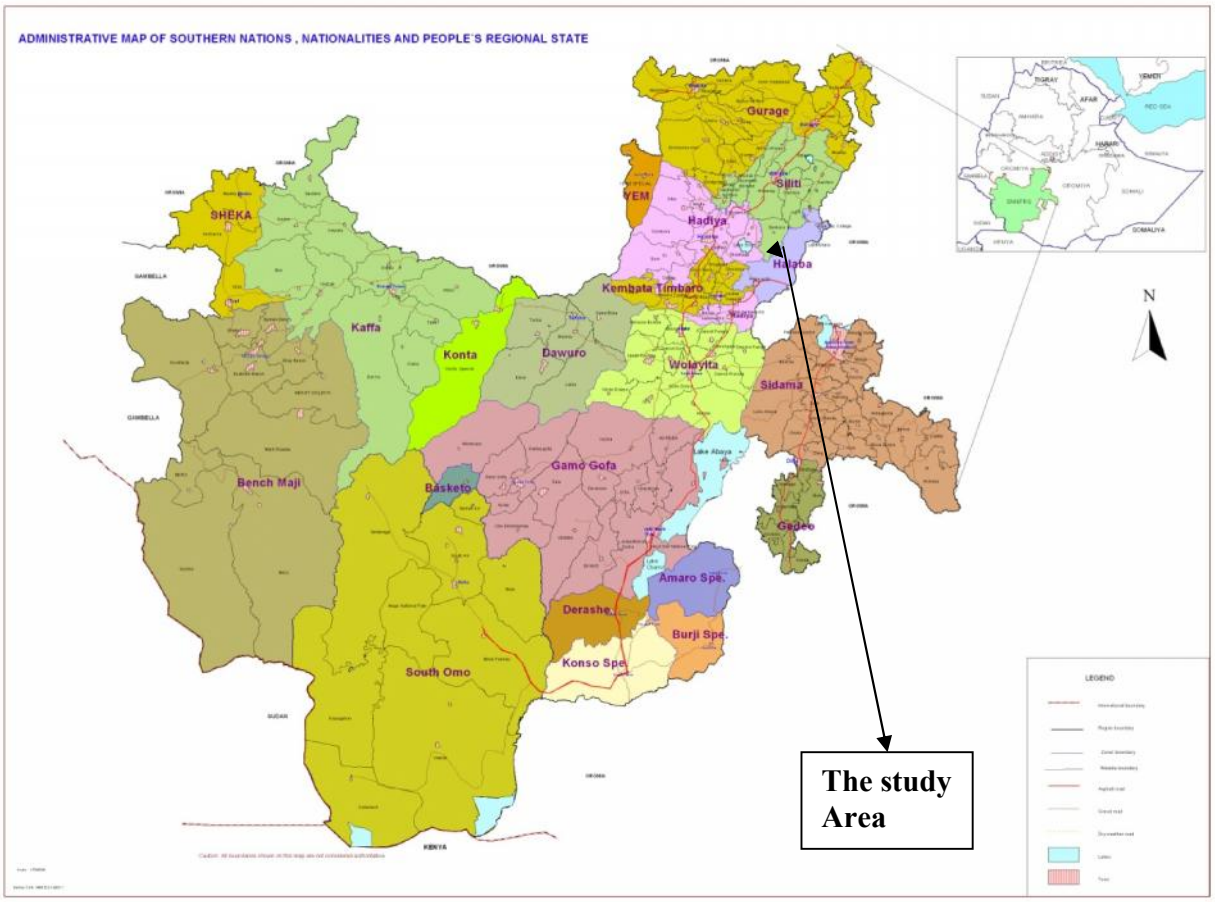

Figure 1 map of the study area

3.2. Data Sources and Requirements

In this study both the primary and secondary data have been collected.

Primary data: its source were smallholder farmers randomly selected from eight different rural kebeles, farmers service cooperative association (Union) and traders at different levels ranging from farmer traders to regional level wholesales. The data have been collected formally by the method of individual interview using pre-tested semi-structured interview schedule questionnaire and informally through focus group discussion with key informants using checklists. In this study primary data were collected focusing on prices, volume and direction of trade, identification of market participants, relationship among marketing agents, role of marketing agents, number of buyers and sellers in the market, marketing functions, facilities and services, production and marketing costs, production and marketing support

services, major constraints and opportunities, and other socio-economic variables of teff and wheat producers and traders were collected.

Secondary data: these are data were collected reviewing documents of secondary sources namely Halaba special woreda office of agriculture and rural development, office of smallscale trade and industry, tax office and woreda marketing agency, Central Statistical Authority (CSA), Bureau of Agriculture and Rural Development, and Bureau of Finance and Economic Development of SNNPRS. Beside relevant published and unpublished reports the researcher browsed websites, and bulletins to generate relevant secondary information focusing on teff and wheat production and marketing. Furthermore, from these secondary sources data on prices, output, number of licensed teff and wheat traders, teff and wheat marketing system, legal requirement to enter grain trading business and data on other socio-economic variables were taken.

One of the most significant issues investigators have to consider when designing a project concerns the type and number of the respondents who will be included in the study. Sampling enables the researcher to study a relatively small number of units in place of the target population, and to obtain data that are representative of the whole target population. (Sarandakos, 1997)

An important decision that has to be taken while adopting a sampling technique is about the size of the sample. Appropriate sample size depends on various factors relating to the subject under investigation like the time aspect, the cost aspect, the degree of accuracy desired, etc (Rangaswamy, 1995; Gupta and Gupta, 2002). If sample is too small, it might be difficult to achieve the objectives of analysis. But if it is too large, it may result in resource wastage when dealing with the sample. Sample error will arise because of not studying the whole population. Whenever sampling, it is usual to miss some helpful information about the population (Levin, 1989; Kothari, 1990). The higher the desired precision or the level of confidence, the larger (more costly) will be the sample (Browen and Starr, 1983). Sampling theory is of little help in arriving at a good estimate of the sample size in any particular situation (Gupta and Gupta, 2002).

A two stage sampling procedure was used to select the rural kebeles and sample households. In the first stage, out of the 73 rural kebeles of Halaba special woreda 38 rural kebeles (24 kebeles for teff and 14 for wheat) were selected purposively, based on the relative better production potential of teff and wheat, and from these potential teff and wheat producing kebeles eight (4 for teff, 4 for wheat) were selected randomly. Before selecting household heads to be included in the sample, teff and wheat grower household heads of each rural kebele were identified in collaboration with experts in the department of grain production and protection of WOARD, kebele leaders, key informants and development agents of the respective rural kebele.

In the second stage, 160 farm household heads were selected from identified teff and wheat growers lists using systematic random sampling technique taking into account probability proportional to size of teff and wheat growers in each of eight (4 for teff, 4 for wheat) selected rural kebeles. As a result, the survey was administered and data were collected and analyzed on 160 respondents of teff and wheat producers separately. Accordingly, the number of respondents in each rural kebele was as shown in the Table 2.

Table 2 Number of sample respondents taken from each PAs

Grain type	Name of selected PAs	No of teff/wheat Producing HHH	No of Sample HHs taken
	Guba	205	21
Teff	Gedeba	185	19
	Holegeba kuke	224	23
	Gerema	166	17
Wheat	Besheno	155	20
	Hantezo	156	20
	1st Tuqa	154	20
	Upper bedene	151	20

Source- WOARD 2007

Contrary to farmers, sampling of traders is not an easy task for the researcher; this might be due to the nature of their mobility and complexity of the work. But it was tried as much as possible to capture all possible level of representative while doing questionnaire pre-test, rapid market appraisal (RMA), as well as collecting data. The total sample size of traders was 43. The teff and wheat traders were selected using systematic random sampling. In

addition to regional and rural markets, following the roots of teff and wheat market chain, traders from terminal market such as Hawassa, Shashemne and Arsi Negelle were also selected using systematic random sampling technique. The sample included licensed and unlicensed market participants. The trader's study focused on all market segments of teff and wheat market. Moreover, while doing pre-test and RMA, the trader fixed the date at which the final formal interview with traders who are selected based on systematic random sampling technique would be held and in doing so the data was collected. All these procedures, made collecting data from traders much extended, time consuming and tiresome.

Table 3 Sample size of teff and wheat traders at different market

Variables	Halaba special woreda markets				Other markets			Total
	Besheno	Qobo	Guba	Alaba qulito	Hawassa	Shashemene	A/Negelle	
Farmer traders	2	4	4	*	*	*	*	10
Urban assemblers	2	*	*	6	*	*	*	8
Wholesalers	*	*	*	17	*	*	*	17
Regional retailers	*	*	*	5	*	*	*	5
Urban retailers	*	*	*	*	1	1	1	3
Total	4	4	4	28	1	1	1	43

* indicates nil (zero), Source survey result 2008

3.3. Method of Data Collection

The interest of obtaining reliable information from farmers and traders in survey is an issue to be given top priority. Smallholder farmers and traders will show little cooperation unless their concerns are taken care of very seriously. In order to gain their trust, the respondents were carefully informed about the objectives of the survey and the direct and indirect benefits from the research. For farmers, in this regard, chair-persons of the respective rural kebeles were first approached and efforts were made to convince them of the objectives of the study. Farmers and traders were also informed that information related to household and farm characteristics would be kept confidential.

Firstly, the farmers' interview schedule was tested at the farm level on 8 randomly selected farm households. In the light of pre-testing, essential amendments were made on such things as ordering and wording of questions and coverage of the interview schedule. Furthermore, the pre-test enabled to know whether farmers had clearly understood the interview schedule. As a result, some questions were deleted or otherwise overlooked due to language problem but those found important were incorporated in the final version of the interview schedule.

After pre-testing and prior to the final administration of the interview schedule, enumerators were given training and briefings on the objective, contents of the interview schedule and were also acquainted with the basic techniques of data gathering and interviewing techniques and on how to approach farmers. Then using the amended structured interview schedule, primary data were collected by using personal interview technique from sampled farmers. The interview schedule was administered by using trained enumerators. In order to increase the reliability of the survey data and to reduce technical and linguistic problems at the farm level; the researcher (author) spent much of his time with enumerators during all survey days. At last, to fill gaps observed during personal interviews, focused group discussions were conducted with group of farmers in each selected rural kebeles.

Regarding trader respondents, independent interview schedule questionnaire was designed to collect data and enumerators who were working as data collector in the site for CSA were recruited and trained on basic data collection principles. During the course of field visit in the study area, the interview schedule questionnaire was tailored to all market conditions. The semi-structured formal interview guidelines were written up in the form of a formal interview schedule questionnaire. Before collecting traders' data the interview schedule questionnaire was pre-tested. This entailed further revision of these lists to make sure that important issues had not been missed. Eventually, the survey was made formally interviewing randomly selected traders using the pre-tested semi-structured questionnaire in the market place where traders are located.

Furthermore, an informal survey in the form of rapid market appraisal (RMA) technique was employed using checklists for trader to obtain additional supporting information for the study. The discussion was made with key trading figures and agricultural and other relevant experts

from the government offices. RMA was made independently for each group before and parallel with trader questionnaire survey.

3.4. Methods of Data Analysis

In these study two types of data analysis, namely descriptive statistics and econometric analysis were used for analyzing the data collected from teff and wheat producers and traders.

3.4.1. Descriptive statistics

This method of data analysis refers to the use of ratios, percentages, means, and standard deviations in the process of examining and describing marketing functions, facilities, services, household characteristics, role of intermediaries; market and trader characteristics, the structure of production costs, profitability, and major constraints and opportunities of production and supply. The following indicators are used in this type of analysis.

Structure Conduct Performance (s-c-p) model:

The model examines the causal relationships between market structure, conduct, and performance, and is usually referred to as the structure conduct and performance (S-C-P) model. In agricultural economics, the most frequently used model for evaluating market performance is based on the industrial organization model. Wolday (1994) also used this model to evaluate food grain market in Alaba Siraro district. Thus, this study used S-C-P model to evaluate how efficiently teff and wheat market of the study area is functioning.

Identification of teff and wheat marketing channels, and the role and linkage of marketing agents in this study; the S-C-P framework was used to meet this objective.

a) Structure of market

Structural characteristics like market concentration, industry maturity, government participation, product differentiation, barriers to entry, and diversification, will be some of the basis to be considered. The perfect competition model will be used as a standard to study the structure of the market.

Market concentration

Market concentration which refers to number and size distribution of sellers and buyers in the market, the firm's objectives, barriers to entry, economies of scale, and assumptions about rival firm's behaviors are relevant in determining the degree of concentration and behaviors and performance (Schere, 1980).

The greater the degree of concentration, the greater will be the possibility of non-competitive behaviour, such as collusion, existing in the market. The concentration ratio (market ratio) was calculated using a formula

$$MSi = \frac{Vi}{\sum Vi} \quad \textbf{(3)}$$

Where MS_i - market share of buyer i

V_i - amount of product handled by buyer i

$\sum V_i$ - Total amount of product handled

$$C = \sum_{i=1}^{r} Si \quad \textbf{(4)}$$

Where C - concentration ratio

S_i - percentage share of the i^{th} firm

r - Number of largest firms for which the ratio is going to be calculated.

Kohl's and Uhl (1985) bring into play as a rule of thumb, four largest enterprises' concentration ratio of 50% or more (an indication of a strongly oligopolistic industry), 33-50 % (a weak oligopoly) and less than that (competitive industry). The problem associated with this index is the arbitrary selection of r (the number of firms that are taken to compare the ratio).

Barriers to entry

A barrier to entry is simply any advantage held by existing firms over those firms that might potentially produce in a given market. Potential entry barriers will be investigated based on:

demand conditions, product differentiation and price elasticity, control over input supplies, legal and institutional factors, scale economies, capital requirement, and technological factors.

B) Market conduct

There are no agreed up on procedures for analyzing the element of market conduct. Market conduct defines the conditions which make possible exploitive relationship between sellers and buyers. It is a systematic way to detect indication of unfair price setting practices and the conditions under which practices are likely to prevail. More over, they cover the following topics: The existence of formal and informal marketing groups that perpetuate such practices; Formal and informal producer groups that affect bargaining power; The distance from major market and its impact on prices; and the feasibility of utilizing alternative market out lets.

c) Market Performance

Marketing efficiency is essentially the degree of market performance. It is defined as having the following two major components: (i) the effectiveness with which a marketing service would be performed and (ii) the effect on the costs and the method of performing the service on production and consumption. These are the most important because the satisfaction of the consumer at the lowest possible cost must go hand in hand with maintenance of a high volume of farm output (Ramakumar, 2001).

The two approaches to measure marketing performance are: marketing margin and the analysis of market channel efficiency. A large number of studies have analyzed the marketing margins for different types of commodities to examine the performance of agricultural products marketing (e.g, Wohlengenant and Mullen, 1987; Schroeter and Azlam,, 1995; Holt, 1993) and (Sexton, Zharg and Chalfant, 2005 as cited on Jema, 2008) argued that even though variations in the margin over time might be attributable to marginal marketing costs under perfect computation, additional factors such as seasonality, technological changes, and sales volume may also explain the variations in the margin.

Marketing Margin- In a commodity subsystem approach, the institutional analysis is based on the identification of the marketing channels. When there are several participants in the marketing chain, the margin is calculated by finding the price variations at different segments

and by comparing them with the final price to the consumer. The consumer price is then the base or the common denominator for all marketing margins. Comparing the total gross marketing margin is always related to the final price or the price paid by the end consumer and then expressed as a percentage (Mendoza, 1995).

Marketing margin is most commonly used to refer to the difference between producer and consumer prices of an equivalent quantity and quality of a commodity. However, it may also describe price differences between other points in the marketing chain, for example between producer and wholesale, wholesale and retail prices (Scarborough and kydd, 1992).

The size of marketing margins is largely dependent upon a combination of the quality and quantity of marketing services, and the efficiency with which they are undertaken and priced. The quality and quantity of marketing services depends on supply and demand of marketing services and/or the degree of competition in the market place. The costs of service provision depend on both exogenous and endogenous factors and the efficiency is determined by the extent of competition between marketing enterprises at each stage.

Large gross margins may not express high profit; this is because size of marketing margins largely depends upon a combination of the quality and quantity of marketing services, and the efficiency with which they are undertaken and priced. The quality and quantity of marketing services depends on supply and demand of marketing services and/or the degree of competition in the market place. Therefore, in using market margin analyses to assess the economic performance of markets, it is always preferable to deconstruct them in to their cost and return elements (Scarborough and Kydd, 1992). However, the challenges of data availability on transaction costs usually create a problem.

Mendoza (1995) warns that precise marketing costs are frequently difficult to determine in many agricultural marketing chains. The reasons are that these costs are often both cash costs and imputed costs, the gross and not the net marketing margin is advised to be calculated. According to Mendoza (1995), “marketing margins” should be understood as the gross marketing margins. He advises marketing researchers to emphasize on gross marketing margins in reporting their findings. In similar manner, in this study, gross marketing margin

was considered instead of net marketing margin, as it was difficult to estimate the implicit costs incurred during transaction of teff and wheat.

Marketing margin was calculated taking the difference between producers and retail prices. The producers' share is the commonly employed ratio calculated mathematically as, the ratio of producers' price (ex-vessel) to consumers' price (retail). Mathematically, producers' share can be expressed as:

$$PS = \frac{P_x}{P_r} = 1 - \frac{MM}{P_r} \quad \textbf{(5)}$$

Where: PS = Producers' share

P_x = Producers price of teff and wheat

P_r = Retail price of teff and wheat which is consumer price

MM = marketing margin

The above equation tells us that a higher marketing margin diminishes producers' share and vice versa. It also provides an indication of welfare distribution among production and marketing agents.

The total marketing margin is given by the formula shown below

$$TGMM = \frac{Consumer\ \ price - Farmers'\ price}{Consumer\ \ price} x100 \quad \textbf{(6)}$$

Where TGMM-Total gross marketing margin

$$GMMp = \frac{price\ \ paid\ \ by\ the\ consumer - marketing\ \ gross\ \ margin}{Price\ \ paid\ \ by\ the\ consumer} \times 100 \quad \textbf{(7)}$$

Where GMMp- Producers' participation (farmers' portion)

The marketing margin was compared with marketing service costs and the results were interpreted. Margins at each stage were calculated and the shares also were compared.

3.4.2. Factors affecting market Supply

Tomek and Robinson (1985) suggested that careful definitions of terms are essential. Total supply in a specific period may depend not only on current production but also on carry over stocks and imports. It is not possible to include an exhaustive set of variables that could affect the household level of marketable supply of the product. But, in this particular study, an attempt was made to estimate determinants of marketable supply of teff and wheat production in Halaba special woreda. In the course of identifying factors influencing teff and wheat supply, the main task is to analyze which factor influences and how? Hence, potential variables which are supposed to influence the quantity of teff and wheat supply need to be explained. Accordingly, the main variables expected to have influence on quantity supply of teff and wheat are explained.

However, before fitting important variables in to the multiple regression models, it is necessary to test multicolinearity problem among continuous variables and check associations among discrete variables, which seriously affects the parameter estimates. According to Gujarati, (2003) indicates, multicolliniarity refers to a situation where it becomes difficult to identify the separate effect of independent variables on the dependent variable because existing strong relationship among them. In other words, multicollinearity is a situation where explanatory variables are highly correlated. There are two measures that are often suggested to test the existence of multicollinearity. These are: Variance Inflation Factor (VIF) for association among the continuous explanatory variables and Contingency Coefficients (CC) for dummy variables.

Thus variance inflation factor (VIF) is used to check multicollinearity of continuous variables. As R^2 increase towards 1, it is a colinearity of explanatory variables. The larger the value of VIF, the more troublesome or collinear is the variable X_i. As a rule of thumb if the VIF greater than 10 (this will happen if R^2 is greater than 0.80) the variable is said to be highly collinear (Gujarati, 2003). Multicollinearity of continuous variables can also be tested through Tolerance. Tolerance is 1 if X_i is not correlated with the other explanatory variable, whereas it is zero if it is perfectly related to other explanatory variables. A popular measure of multicollinearity associated with the VIF is defined as

$$VIF(X_j) = \left(1 - R_j^{2}\right)^{-1} \quad \textbf{(8)}$$

Where, R_j^2 is the multiple correlation coefficients between explanatory variables, the larger the value of R_j^2 is, the higher the value of VIF (X_j) causing higher collinearity in the variable (X_j).

Contingency coefficient is used to check multicollinearity of discrete variable. It measures the relationship between the raw and column variables of a cross tabulation. The value ranges between 0 - 1 , with 0 indicating no association between the raw and column variables and value close to 1 indicating a high degree of association between variables. The decision criterion ($CC \leq 0.75$) is that variables with the contingency coefficient is computed as follows

$$CC = \sqrt{\frac{\chi^2}{N + \chi^2}} \quad \textbf{(9)}$$

Where, CC is contingency coefficient, χ^2 is chi-square test and N is total sample size.

As cited in Paulos (2002), if the value of CC is greater than 0.75, the variables are said to be collinear. Statistical package SPSS version 12 was used to compute both VIF and CC. In order to explain farmer's teff and wheat market participation, continuous and discrete variables were identified based on economic theories and the findings of different empirical.

In this study, multiple linear regression model was fitted to survey data to generate information about determinants of teff and wheat supply. Based on literatures, the teff and wheat supply model to be estimated in this study would take the following form

$$Y_i = \mathbf{X_i}\beta + U_i \quad \textbf{(10)}$$

Where $\mathbf{Y_i}$ = market supply of teff or wheat for each model

$\mathbf{X_i}$ = a vector of explanatory variable, and '**i**' is 1, 2, 3… n

β= coefficient of i^{th} independent variable

$\mathbf{U_i}$ = unobserved disturbance term

The main hypothesized variables expected to influence marketable supply of teff or wheat in the study area are explained in the following manner:

Dependent Variable:

Quantity Supplied (QT_SUPP): It is a continuous variable which represents dependent variable; the amount of teff and wheat actually supplied to the market by household in the year 2008/09 which is measured in quintals.

The Independent Variables:

The following explanatory variables were hypothesized to influence the marketable supply of teff and wheat in the study area.

Lagged price (PRC-LAG): The variable market price of the product (teff or wheat) was measured in Birr per quintal. Tomek and Robinson (1985) argued that the product price has direct relations with marketable supply and hence it was expected to affect the household marketable supply of teff or wheat positively in such a way that prices of 2006/07 can stimulate production of teff or wheat, and thus marketable supply for 2007/08.

Quantity produced (QUANPROD): It is an economic factor and continuous variable that can affect the household level marketable supply and measured in quintals per hectare. The variable is expected to have positive contribution in smallholder marketable supply of teff and wheat As Tomek and Robinson (1985) argued, quantity produced is assumed to affect the marketable supply positively, because a farmer that obtains high yield can supply more to the market than a producer who had fewer yields.

Size of landholding (FARMSIZE): This variable was a continuous variable measured in terms of number of hectares allocated to teff or wheat and was expected to affect the household level of teff or wheat marketable supply positively (Tomek and Robinson, 1985). This is because, producers who own large area holding can produce more than a producers who own less area and thus to supply more to the market.

Family size (FAM-SIZE): It is a continuous variable measured in adult equivalent (Strock *et al*., 1991) i.e. the availability of active labor force in the household, which affects farmer's marketable supply. Since production is the function of labor, availability of labor assumed to have positive relation with volume of supply. However, family size is expected to have positive impact on volume of sales, but larger family requires larger amount for consumption which reduces marketable surplus. A study by Singh and Rai (1998) revealed that marketed surplus of buffalo milk to be negatively related farm family size. However, a study conducted by Wolday (1994; as cited by Rehima, 2007) identified that family size has significant positive effect on quantity of teff marketed and negative effect on quantity of maize marketed. From this context, family size is expected to have positive or negative impact on volume of sale.

Extension service (EXT_SRV): The variable extension service has been measured as a dummy taking value of 1 if teff/wheat producing household head has contacted with a development agent (DA) and 0 otherwise. Extension is expected to have positive effect on volume of marketable supply of teff and wheat through its stimulation of production and productivity. Farmers that have frequent contact with DAs will have better access to information and could adopt better technology that would increase their marketable supply of teff or wheat.

Access to credit (CRED_ACC): Access to credit was measured as a dummy variable taking value of 1 if the teff/wheat producing farmer had access to credit and 0 otherwise. This variable is expected to influence the marketable supply of teff or wheat positively on the assumption that access to credit improves the financial capacity of teff/wheat producing farmers to buy modern inputs, there by increasing production which is reflected in the marketable supply of teff or wheat.

Education level of HHH (EDU-LEV): This variable was measured using formal schooling of the household head and hypothesized to affect marketable supply positively. It has taken dummy values 1 if the household head attended any formal education and 0 otherwise. This is due to the fact that a farmer with good knowledge can adopt better practices than illiterates

that would increase marketable supply. Holloway *et.al*, (1999) argued that education had positive significant effect on quantity of milk marketed in Ethiopian highlands.

Access to market information (MKT-INFO): This is measured as a dummy variable taking a value of 1 if teff/wheat producing farmer had access to market information and 0 otherwise. The general idea is that maintaining a competitive advantage requires a sound business plan. Again, business decisions are based on dynamic information such as consumer needs and market trends. This requires that an enterprise is managed with due attention to new market opportunities, changing needs of the consumer and how market trends influence buying (CIAT, 2004). Here, market information has been hypothesized to affect teff or wheat marketable supply of farm households positively. Because, producers that have access to market information are likely to supply more teff or wheat to the market. Goetz (1992) noted that better market information significantly raises the probability of market participation for potential selling households.

Price of other crops (HOR-PRICE): it is a continuous variable that can affect the marketable supply and measured in birr per quintal. An increase in price of other crops produced in the farm is expected to have negative effect on marketable supply of teff and wheat. In this case, price of pepper was taken as variable since it is important and potential substitute crop grown in the study area.

Age of household head (AGE): It is a continuous variable and measured in years. This may be the fact that age is a proxy measure of farming experience of household. Aged households are believed to be wise in resource use, and it is expected to have a positive effect on marketable surplus.

Sex of the household head (SEX): In mixed farming system, both men and women take part in crop production & management. Generally, women contribute more labor input in area of land preparation, planting, weeding, harvesting and sale of teff and wheat. However, obstacles, such as lack of capital, and access to institutional credit, access to extension service, may affect women's participation and efficiency in teff and wheat production (Tanga *et al*., 2000). Therefore, it is not possible to tell a prior about the likely sign of the coefficient of sex in sales volume.

Table 4 Description of dependent and independent variables used in the model

Variables	Explanation	Category	Value
QT-SUPP	Quantity supplied	Continuous	Quintal
	Independent variables		
PRC-LAG	Lagged Market price	Continuous	Birr
QUANPROD	Quantity produced	Continuous	Quintal
FARMSIZE	Size of land holding	Continuous	Hectare
FAM-SIZE	Family size of HHH	Continuous	Man equivalent
EXT-SRV	Access to extension service	Dummy	0=no 1=yes
CRED-ACC	Access to credit	Dummy	0=no 1=yes
EDU-LEV	Education level of HHH	Dummy	0=no 1=yes
MKT-INFO	Access to market information	Dummy	0=no 1=yes
HOR-PRICE	Price of other crops	Continuous	Birr
AGE	Age of the HHH	Continuous	Number of years
SEX	Sex of the HHH	Dummy	0=female 1=male

4. RESULTS AND DISCUSSION

This chapter summarizes the major findings of the study. Both descriptive statistics and econometric analysis were used to analyze the primary data. Descriptive statistics were employed to describe the demographic characteristics of sample farmers and traders. Moreover, the cost structure and profitability of teff and wheat, production and marketing support services, structure, conduct and performance were studied to measure efficiency. Econometric analysis was used to identify factors affecting supply of teff and wheat in the study area.

4.1. Socio-demographic characteristics

This section focuses on describing; (a) socio demographic characteristics of farmers, including personal and demographic characteristics, land size and land use, farming and non farming experience, income, access to service, farm inputs utilization, production and storage, resource ownership, etc.; and (b) traders' demographic characteristics, and resource ownership such as physical and financial resources.

4.1.1. Farmer's demographic characteristics

The variables used to describe demographic characteristics of sample farmers were household heads' sex, age, religion, marital status, education level, family size and ethnicity. The results of the study (Table 5) indicated that 78.75% of teff and 86.25% of wheat producing sample households were male headed households. The remaining 21.25% of teff and 13.75% of wheat sample households were female headed households. In terms of marital status, whereas 98.75% of teff and 93.75% of wheat producing sample households were married, only 1.25% of teff and 6.25% of wheat producing sample households were single. Furthermore, 97.5% of teff and all (100%) of the wheat producing sample households were Muslim, belonging to Halaba ethnic group.

Table 5 Demographic characteristics of sample farmers

Variables		Teff producers		Wheat producers		Total sample	
		N=80	%	N=80	%	N= 160	%
Age of HHH	Mean	44.97 (11.706)		38.48 (11.13)		41.725 (13.471)	
Sex of HHH	Male	63	78.75	69	86.25	132	82.25
	Female	17	21.25	11	13.75	28	17.25
Religion	Muslim	78	97.5	80	100	158	98.75
	Orthodox	2	2.5	-	-	2	1.25
Marital status	Single	1	1.25	5	6.25	6	3.75
	Married	79	98.75	75	93.75	154	96.25
Education level	Mean	2.45 (3.006)		2.41 (2.896)		2.43 (3.165)	
Family size	Mean	5.96 (1.987)		5.2 (1.977)		5.58 (2.121)	
Ethnicity	Halaba	78	97.5	80	100	158	98.75
	Kembata	1	1.25	-	-	1	0.625
	Amhara	1	1.25	-	-	1	0.625

Numbers in parenthesis show standard deviations, N represents sample population

Source- own survey 2008

As Table 5 depicts, the age of teff producing sample respondents' ranged from 25 to 72 years, with a mean age of 44.97 years. Likewise, the age of wheat producing sample respondents' ranged from 20 to 67 years, with a mean age of 38.48 years. This shows that teff producing sample farmers had higher mean age than wheat producing sample farmers. The overall mean age of all teff and wheat producing sample respondents was 41.73 years.

The educational background of the sample household heads is believed to be an important feature that determines the readiness of household heads to accept new ideas and innovations. More educated farmers are expected to adopt new technologies to increase their land and labor productivity. The average number of years of schooling completed by teff and wheat producing respondents were 2.45 and 2.41, respectively. The average schooling of all teff and wheat producing sample respondents was 2.43 years. Based on categorization of education, the data indicated that 50.63% of the sample respondents were illiterate, 24.38% atteined formal education ranging from grade 1 to 4, while 20.63% had formal education from grade 5 to 8. The remaining 4.38% attained education level ranging from grades 9 up to 10.

4.1.2. Land size and land use

Land is perhaps the single most important factor of production and measure of wealth in the study area. The average land owned by teff and wheat producers was 2.93 and 3.15 hectares respectively (Table 6). Cultivated land used for the production of crops covered 89% and 83% of the total land holdings of teff and wheat producing sample household on average had respectively. The remaining land represents land used for pasture, homestead farm, fallow land and land rent-in and rent-out.

Table 6 Land owned and farmers' purpose of allocation (average)

Land use (ha)	Teff producers	Wheat producers	Total sample
Total owned land	2.93	3.15	3.04
	(1.42)	(1.28)	
Cultivated land	2.61	2.66	2.64
	(1.31)	(1.22)	
Pasture land	0.24	0.29	0.27
	(0.11)	(0.17)	
Home stead farm	0.23	0.24	0.23
	(0.1)	(0.1)	
Fallow land	0.02	0.07	0.04
	(0.08)	(0.18)	
Land rent in	0.25	0.4	0.33
	(0.44)	(0.74)	
Land rent out	0.05	0.2	0.13
	(0.21)	(0.13)	

Own survey 2008, numbers in parenthesis represent standard deviations

The survey results indicate that the cultivated landholding of teff producing sample households ranged from 0.44 to 10 hectares with standard deviation of 1.22 hectare. For wheat producing sample households it ranged from 0.88 to 7.5 hectare with the standard deviation of 1.3 hectare. The average cultivable landholding of teff and wheat producing sample respondents were 2.61 and 2.66 hectares respectively. This figure is a bit higher than the national average, which is 1.5 hectare. This implies that there was relatively higher land holding in the study area. However, the key informant farmers indicated that fragmentation of land is causing social as well as economic problems in the woreda.

The average cultivated land allotted to the production of major crops such as teff, wheat and haricot bean by teff producing sample households was 0.83, 0.82 and 0.43 hectares in the

some order. Likewise, the average cultivated land allotted by wheat producing sample households for the production of major crops such as maize, wheat, teff, and red pepper was 0.81, 0.67, 0.44 and 0.39 hectare respectively. Proportionally, of the total cultivated land teff and wheat producers owned 32% of teff and 25% of wheat producing farmers' cultivated land used for the production of teff and wheat respectively. (Refer appendix table 5)**.**

Table 7 Experience and income of respondents

Variables	N=80 Teff growers	N=80 Wheat growers
Production experience (years)	26.7 (10.66*)*	19.11 (11.55)
Annual farm income (birr)	5,754.61 (5,782.5)	11,422 (12,832.47)
Non farm experience (yes, %)	17.5	12.5
Non-farm experience (years)	2.34 (4.5)	0.86 (2.55)
Annual non farm income (birr)	2,768 (2,488)	1,006 (856)

Source- own survey 2008, numbers in parenthesis represent standard deviations

The average farm production experience of teff and wheat producing respondents were 26.7 and 19.1 years respectively (Table 7). The results indicated that teff producing households had higher farm production experience than wheat producers. The result also shows that farming is the main source of households' income for both teff and wheat producing sample households. The average annual farm income of teff and wheat producing sample households was Birr 5,754.61 and 11,422 respectively. Farm income of wheat producing households was as twice as the income of teff producing households. The higher income of wheat producing respondents was resulted from price escalation of red pepper since wheat producing sample kebeles were also potential red pepper producers and suppliers to the market.

During slack seasons many farmers in the woreda earn additional income by engaging in various off-farm activities. This is believed to raise their financial position to acquire new inputs. From the Table 7, one can see that non-farming activities were the next major sources of income for 17.5 % and 12.5 % of teff and wheat producing sample households respectively. The teff and wheat producing households had a mean non-farming experience of 2.34 and 0.86 years respectively. However, the sample teff and wheat producing households

had annual average non-farm income of Birr, 2,768 and 1,006 respectively. The respective standard deviations of the variables were Birr 2488 and 856. The average annual non-farm income obtained by teff producing households was higher than wheat producing sample households'. This might be due to the fact that teff producing sample households had better non-farm experience and are residing closer to major market towns which gave them better chance to get engaged on non-farm activities.

In the study area petty trading, casual labor activities, participation on productive safety net program, income from horse and donkey drawn carts and pepper trading were found to be the major off-farm activities in which sample households were involved to earn additional income.

4.1.3. Access to markets and other services

Access to different services has important contribution in improving production and productivity and thereby increasing marketable surplus and ultimately for increasing the income of smallholder farmers. The most important services that are expected to promote production and marketing of teff and wheat in the study area include proximity to markets, access to credit, access to extension service, and access to market information.

Proximity to markets

Regarding the distance taken to travel from home to the nearest market place where they sold their product, sample teff and wheat producing farmers reported that they had to travel an average of 57.13 and 71.19 minutes respectively with corresponding standard deviations of 29.12 and 45.31 minutes. The minimum and the maximum distance that sample teff producing respondents had to travel to access nearest market centers were 10 and 120 minutes, respectively. For wheat producing households, this was 5 and 180 minutes, respectively.

Access to market information

The amount of marketable surplus primarily depends on access to market information and the willingness and ability of farmers to use the information. The role of market information in

decision making process is to reduce risks and uncertainties related to market and enable farm households to make the right decision in sales and price of the product produced and inputs used in the production process.

Access to market information is extremely limited in the Ethiopian grain market. At the producer level, farmers have very limited information on price prevailing even in nearby markets (Wolday, 1994). It is assumed that producers and traders with access to market information can make better decision on how much to produce and market. However, there was no organized market information system to support farmers in the study area. According to Table 8, about 90% of teff and 93.75% of wheat producing sample households revealed that they search the price information of nearby market before they sold their product. About 6.25% of teff producers and 3.75% of wheat producers had obtained price information from the central market before selling their produce.

Table 8 Farmers' access to price information

Variables	N=80 Teff	N=80 Wheat
Nearby market information (yes, %)	90	93.75
Central market information (yes, %)	6.25	3.75
Sources of information		
Traders (%)	93.05	93.33
Billboard (%)	2.78	2.67
Brokers (%)	1.39	2.67
Telephone (%)	2.78	1.33

Source own computation 2008

Sample respondents were also asked the source of the price information. About 93.05% of the teff and 93.33% of wheat producing sample households revealed that they obtained price information from traders. Beside traders, respondents indicated that brokers, mobile telephone, and billboards displayed in the market place with the support of IPMS were information sources contributing to less than 7% of price information obtained for both teff and wheat producing farmers (Table 8).

Access to credit

Access to credit is one way of improving smallholder farmers' production and productivity. Farmers' ability to purchase inputs such as improved seed and fertilizer is tied with access to credit. Farmers with access to credit can minimize their financial constraints and buy inputs more readily than those with no access to credit. Thus, it is expected that access to credit increase the production of agricultural crops in general and teff and wheat in particular. In the study area, access to credit is influenced by availability of cash on hand. Farmers access credit from formal (banks, MFI, and cooperatives) and informal sources (Iqub, traders' friends, relatives and money lenders). Government institutions and NGOs also provide credit to farmers. The Woreda Office of Agricultural and Rural Development and farmers' service cooperatives were organizations that distribute improved seed and fertilizer on credit, but they require down-payment as a condition to provide credit. Thus, only those farmers who can pay the required down-payment can benefit from input credit service of the government. On the other hand, farmers who can not pay the down-payment would be devoid of the opportunity.

Table 9 Access to credit and extension services

Variables	N=80 Teff	N=80 Wheat
Credit support (yes, %)	16.25	11.25
Amount taken (birr)	292.43 (980.48)	65.11 (347.45)
Extension contact (yes, %)	33.75	43.75

Numbers in parenthesis indicate standard deviations. Source survey result 2008

In the study area, input credit was made available to farmers through the woreda office of Agriculture and Rural Development and Service Cooperatives. Table 9 shows that only 16.25% of teff and 11.25% of wheat producing farmers reported that they had access to credit while the remaining majority (83.75% of teff and 88.75% of wheat producing sample respondents) reported that they had no access to input credit that can be used to buy improved seeds and fertilizer.

Access to extension services

Access to agricultural extension services is expected to have direct influence on the production and marketing behavior of the farmers. The higher access to the extension service, the more likely that farmers adopt new technology and innovation. To this end, the government has been attempting to fill the required knowledge and achieve food self sufficiency in the country by placing in each Kebele administration three development agents (DAs) and building a farmer training center (FTC). The kebele level development agents are the most important sources of extension services to transfer agricultural technologies and innovations to farmers. The effort to disseminate new agricultural technologies is influenced by the efficiency of communication between the development (change) agent and the farmers at grassroots level.

Table 9 depicts that out of the total respondents of teff and wheat producing sample households, only 33.75% of teff and 43.75% of wheat producers had access to extension services provided by development agents of the Woreda Office of Agriculture and Rural Development. The remaining 66.25% of teff and 56.25% of wheat producing sample households responded that they did not receive any extension services from development agents. The result of this study questions the efficiency and effectiveness of the government extension program.

4.1.4. Farm Inputs utilization

Fertilizer application is one of the most important agricultural practices that are used by teff and wheat growers in the study area. Moreover, proper application of the recommended fertilizer rate is important to obtain the required production and marketable supply. Farmers in the study area use varying fertilizer rate, which is below the national level blanket recommended rate.

Although, all sample respondents applied DAP (Di Ammonium Sulphate) fertilizer and herbicides to produce teff and wheat, the rate of application is below the recommendation. As indicated in Table 10, the rate of application of DAP ranged from 16 kg to 100 kg per hectare for teff producers and from 33.33 kg to 200 kg per hectare for wheat producing farmers. The average rate of DAP fertilizer used for the production of teff and wheat was 54.47 kg and

80.83 kg per hectare respectively. The majority, about 61.3% of sample teff respondents, used DAP fertilizer rate ranging from 16 kg to 50kg per hectare. About 26.2% used DAP rate of 52 kg to 89 kg per hectare and the remaining 12.5% used the recommended rate of 100 kg per hectare. Moreover, 35% of wheat producing sample respondents used DAP fertilizer rate ranging from 33.33 kg to 50 kg per hectare, 57.5% of the wheat sample respondents used DAP fertilizer rate ranging from 60 kg to 100 kg per hectare and the remaining 7.5% 133 kg to 200 kg per hectare.

Table 10, Agricultural input used by teff and wheat producers

Variables	Teff N=80	Wheat N=80	Total N=160
DAP (yes) %	100	100	100
Urea (yes) %	36.25	22.5	36.25
Herbicides (yes) %	100	100	100
DAP used kg/ha	54.47	80.83	64.23
	(23.43)	(36.87)	(42.31)
Urea used kg/ha	8.39	18.33	12.91
	(16.34)	(26.74)	(33.43)
Seed rate kg/ha	24.34	144.15	112.76
	(5.5)	(46.55)	(88.92)
Herbicides lt/ha	1.55	1.39	1.49
	(0.32)	(0.87)	(0.98)

Source own survey result 2008

UREA is also one of the fertilizer type used in the study area as an input to produce teff and wheat. Although, application of UREA has several advantages beside production increment, only 36.25% and 22.5% of teff and wheat producing sample respondents applied UREA fertilizer in the production respectively. The average application rate of UREA fertilizer by teff and wheat producers was 8.39 and 18.33 kg per hectare respectively. This figure indicated that UREA used per hectare of land was much below the recommended rate.

The rate of application of UREA fertilizer for teff and wheat production ranges from 0 to 50 kg per hectare and 0 to 100 kg per hectare respectively. About 76.3% of teff producing sample respondents did not use UREA fertilizer at all. The remaining 23.7% used UREA application rate ranging from 13 to 50 kg per hectare. Likewise, about 62.5% of wheat

growing sample farmers did not use UREA fertilizer as an input in the production. But 32% wheat growers used UREA fertilizer rate ranging from 25 to 50 kg per hectare. The remaining 5% of wheat producing sampler households applied UREA fertilizer rate ranging from 51 to 100 kg per hectare. The wider range of UREA fertilizer application rate by the farmers needs a serious attention. This implies the presence of knowledge gap among farmers. Therefore, training should be provided to the grassroots level farmers in order to narrow the existing knowledge gap.

Sample farmers indicated different reasons for applying lower rate of fertilizer. The first reason was lack of financial capacity. This was followed by unavailability of fertilizer at the right time. In their view, the amount of fertilizer to be applied per hectare of land depends on intensity of land preparation and fertility status of the plot. The result will assist in revisiting the blanket recommendations for the entire woreda. There is a need to conduct site-specific trails by the farmers themselves.

Improved seed is also one of the most important inputs that determine productivity and production of teff and wheat. However, the potential production response of improved seeds is determined by proper rate of fertilizer application. During the period under the study, seeding rate of teff and wheat producers ranged from 15 to 44 kg and 50 to 250 kg per hectare respectively. The average seeding rate of teff and wheat producers applied per hectare of land were 24.34 kg and 144.15 kg respectively with corresponding standard deviation of 5.55 and 46.55kg. Although, the average seeding rates applied per hectare of land by of teff and wheat producers were closer to the recommended seed rate, which is 25 to 30kg for teff and 150kg for wheat, the wider ranges of seeding rate applied by teff and wheat producers require a serious attention. This would require training on the rate of application of seeds and fertilizer to the farmers.

Table 11 Type of farm inputs, sources and mode of payment

Groups	Inputs	Input sources (%)				Mode of payment (%)		
		Private dealers	Cooperatives	WOARD	Their own	Cash	Credit	Their own
Teff	Fertilizer	56.75	16.25	27.5	-	90	10	-
	Seeds	63.75	5	7.5	23.75	70	6.25	23.75
Wheat	Fertilizer	66.25	3.75	30	-	97.5	2.5	-
	Seeds	37.5	15	11.25	36.25	55	8.75	36.25

Source – survey result 2008; - indicate nil (zero),

Table 11 depicted that the free and private dealers are the main sources and suppliers of chemical fertilizer. About 56.25% of teff and 66.25% of wheat producing sample households bought fertilizer from the private dealers. Institutions like Cooperative Associations and Woreda Office of Agriculture and Rural Development (WOARD) supplied 43.75% and 33.75% of the fertilizer required by teff and wheat producing sample households respectively. Private dealers were again the major source of seeds supply and they supplied 63.75% of teff and 37.5% of wheat seeds required by sample respondents. Cooperatives and WOARD were the other sources that provided 12.5% of teff seeds and 26.25% of wheat seeds to sample respondents. The remaining 23.75% of teff and 36.25% of wheat producing sample respondents used seeds obtained from their own source.

Concerning the mode of payment for inputs, the study revealed that 90% of teff and 97.5% of wheat producing respondents bought fertilizer on cash basis and the remaining 10% of teff and 2.5% of wheat producing sample respondents bought fertilizer on credit basis from cooperatives by making required initial down-payment. With regard to the mode of payment for improved seed, it was understood that 70% of teff and 55% of wheat producing sample respondents in the study area bought improved seeds on cash basis. However, only 6.25% of teff and 8.75% of wheat producing sample households bought improved seed on credit basis from cooperatives. The remaining farmers used seeds from their own sources (see appendix 6).

4.1.5. Household resource ownership

Households access to productive resource such as land, livestock, farm tools, labor force available, type of house owned, bee colony etc is essential for agricultural production and marketing. Livestock is the farmers' most important source of income, food and draft or traction power for cultivation of land in the study area. Hence, households with larger livestock holding have better access to draft power than those with less. Livestock holding is also one of the main cash sources to purchase agricultural inputs. To assess the livestock holding of each household, the Tropical Livestock unit (TLU) per household was calculated (see appendix table 3). The livestock holding of sample households ranged from 1.25 to 56.21 TLU for teff and 2.02 to 66.55 TLU for wheat producers, implying the existence of large variation among the households in livestock ownership. The average livestock holding of teff and wheat producers was 8.29 and 9.39 TLU, respectively with standard deviation of 7.14 TLU for teff and 8.32 TLU for wheat producers.

Labor is one of the factors that influence agricultural production and marketing in the study area. Households having large number of working labor-force will be in a better position to manage the labor intensive agricultural activities. Moreover, large working labor-force in a family means that the household may not need to hire additional labor-force required due to the fact that the cash saved from using own labor-force could be used for purchase of agricultural inputs required for production and marketing of teff and wheat.

For sample respondents in the study area labor availability was estimated using Man-Equivalent (ME) (see appendix table 3). The average labor force availability in terms of Man-Equivalent for teff and wheat producing sample households in the study area was 3.24 and 2.26 respectively.

Land is the other pivotal factor of production used to produce teff and wheat. Table 12 depicts that the average landholding of teff and wheat producing sample households was 2.93 and 3.15 hectares respectively.

Table 12 Asset ownership of farmer respondents

Resource owned	N=80 Teff	N=80 Wheat
Livestock (TLU) (yes, %)	100	100
Mean	8.29	9.39
	(7.14)	(8.32)
Land owned (yes, %)	100	100
Mean	2.93	3.15
	(1.43)	(1.28)
House owned, Grass roofed (yes, %)	98.75	100
Mean	1.55	1.9
	(0.61)	(0.76)
Corrugated iron sheet (yes, %)	21.25	11.25
Mean	1.18	1.11
	(0.32)	(0.27)
Plowing tools (yes, %)	97.5	100
Labor force availability (ME)	3.24	2.26
	(1.31)	(0.73)
Bee colony (yes, %)	11.25	21.25
Mean	2.65	3.22
	(3.43)	(3.77)

Figures in parenthesis represent standard deviation

Source own survey result 2008

The number and type of houses owned by household heads is also another indicator of the wealth status of respondents. The average number of grass roofed houses owned by teff and wheat producing sample respondents were 1.55 and 1.9 respectively. Likewise, the average corrugated iron sheet houses a household head owned was 1.18 for teff and 1.11 for wheat producing sample respondents (Table 12).

4.1.6. Production, storage and marketing of teff and wheat

Following red pepper, the production of teff and wheat is the main source of cash for farmers in the study area. Production of teff and wheat in the study area is a rain-fed with only once in a year harvest.

Table 13 Area cultivated, production and productivity of teff and wheat

Variables	N=80 Teff	N=80 Wheat
Area cultivated (ha)	0.83	0.67
	(0.61)	(0.4)
Quantity produced per HHH(qt)	6.18	13.36
	(5.26)	(10.07)
Productivity per ha (qt)	7.63	19.05
	(2.41)	(5.04)
Amount marketed per HHH (qt)	5.33	6.58
	(4.69)	(8.77)

Numbers in parenthesis indicate standard deviations. Source, survey result 2008

Table 13 depicted that the average land allocated for the production of teff and wheat by sample teff and wheat producing respondents was 0.83 and 0.67 hectares respectively with corresponding standard deviation of 0.61 and 0.4 hectares. The minimum and maximum land allocated by sample respondents to the production of teff was 0.125 and 5 hectare respectively and it was 0.02 and 1.75 hectares for wheat production, respectively. The average quantity of teff and wheat produced per sample households was 6.18 and 13.36 quintals respectively but the average productivity of teff and wheat per hectare was 7.63 and 19.05 quintals respectively (Table 13).

In the study area, of the total volume of teff and wheat produced, 86.2% of teff and 49.2% of wheat were supplied to the market. Sample respondents also reported that the amount of teff and wheat marketed per household head varied from 0.5 to 18 quintals for teff and 2 to 44 quintals for wheat. The corresponding standard deviation was 4.69 and 8.77 quintals. Moreover, the average amount of teff and wheat marketed per sample household was 5.33 and 6.58 quintals respectively (Table 13).

It is assumed that supply of teff and wheat exceeds demand in the immediate post harvest period. The glut during harvesting season reduces producer prices and wastage rates can be high. For much of the reminder of the period before the next harvest, the product is usually in short of supply, with traders and consumers having to pay premium prices to secure whatever

scarce supplies are available in the market. It is evident that storage plays an important role in balancing supply and demand inter year (within the year) and intra year (between years).

In order for farmer to reduce post harvest losses, there is a need to select appropriate storage systems (types) for teff and wheat. The two major storage systems typically used in the study area are filling in sack and placing it on the floor inside farmers' house and storing the grain in 'Gotera'. 'Gotera' is a traditional small grain storage made of wood, wet dung and straw usually used by smallholder farmers. Table 14 depicts that 100% of teff and 95.5% of wheat producing sample households reported that they stored their teff and wheat by filling the sack then placing it on the floor inside their houses and the remaining 4.5% of wheat producing respondents stored in 'Gotera' that was constructed near farmers' homestead.

Table 14 Type of storage facility, purpose and length of storing teff and wheat

Variables	N=74 Teff	N=67 Wheat
System		
Filling in sacks and place it on floor (%)	100	95.5
"Gotera'/store (%)	*	4.5
Storage length (month)	3.86 (2.16)	4.27 (1.86)
Reason		
High price expectation (%)	90.5	92.5
Lack of demand (%)	*	3
Saving purpose (%)	2.7	3
Other (%)	6.8	1.5

*Indicate zero, figures in parenthesis represent standard deviations, N= total sample size

Source own survey result 2008

The result reported from respondents' shows that, about 92.5% of teff and 83.75% of wheat producing sample farmers avoided sales of their product immediately after harvest. Table 14 also shows that, the average storage time of teff and wheat was 3.86 and 4.27 months respectively. In addition, 90.5% of teff and 92.5% of wheat producing sample households indicated that the major motive behind storing teff and wheat was expectation of higher price.

4.2. Teff and wheat marketing participants, their roles and linkages

In this study, different stakeholders were involved in bringing teff and wheat from the point of production (farm gate) till it reached the final destination (consumers). According to the data obtained market participant identified in the transaction process of teff and wheat in the study area include farmers/producers, farmer traders, urban assemblers, regional wholesalers, retailers, processors (millers, flour mill) and commission agent. The market participants involved in different activities (wholesale, retail, assembly etc), in the study area were categorized into different categories.

Producers/farmers: these are marketing agents who participate both in production as well as marketing of surplus commodities they produce. As the same time, they transport teff and wheat to the nearest markets (village market) or regional markets by themselves, either using pack animals, or animal driven carts, or else medium-size Isuzu trucks, over an average distance of 1.11 hours by wheat producers and 57 minutes by teff producers. They had several options to sell their product, selling directly or selling through broker to assemblers (rural and urban assemblers) and regional wholesalers. Alternatively, they sell to village assemblers known as "farmer traders" who assemble teff and wheat from large number of farmers. Farmers also sell their products directly to regional wholesalers in regional markets. Some of the farmers in the sample also sold their teff and wheat to the consumers in the regional market.

Village markets are markets which are closest to farmers' resident, having less marketing facilities such as road, electricity, potable water etc. Farmers sell smaller quantity of teff and wheat on such markets. Where as regional markets are surplus markets that are found in the woreda town where, most of surplus agricultural products are transacted. Contrary to regional markets, deficit markets that are found in larger towns where most surplus products are flown termed as Terminal markets.

Farmer trader/rural assemblers: Farmer traders/rural assemblers are farmers or part-time traders in the assembly markets who used to buy small quantity of teff and wheat from farmers in village markets during slack period for the purpose of reselling it to consumers or

regional wholesalers in either in rural or regional market. They use their financial resources and their local knowledge to buy teff and wheat from the surrounding area.

Urban assembler: The assemblers play important role in the system of assembly. They consolidate the produce of individual farmers produce and prepare it for marketing. Assemblers not only know the areas of surplus well, but also speak the local language well. They also relieve their customers of the burden of quality by controlling the small quantities of teff and wheat typically offered by farmers. On the market days early in the morning they took money from regional wholesalers to buy the produce so that they transfer the purchased product to the trader who already delivered them money on the same market day. Although regional wholesalers are the main customers of urban assemblers, they also sell the product to retailers and consumers.

Brokers: these are agent middlemen who facilitate trades (buying and selling) between farmers and traders (wholesalers, urban assemblers, retailers), but does not usually physically handle products. These agents are not permanent brokers rather their main economic activity is farming during production season of the year. These intermediaries play important role in bringing farmers of their home residence sell their marketable surplus to the trader whom they undertook their brokerage activity. Brokers obtain their reward based on the amount they facilitate transaction usually 10 to 20 birr per market day.

Wholesalers: Wholesalers are major market participants of the marketing system who usually buy teff and wheat of larger volume than any other actors in the marketing system and resell the products to urban retail merchants and processors than ultimate customers. Wholesalers reside in woreda market town and purchase teff and wheat either through broker or directly from farmer or farmer trader or urban assemblers. Commodities bought from different sources put together in one place (store) to be processed so that uniformity of the product will be attained. Moreover, the processed commodities will be supplied to the deficit terminal markets (Hawassa, Shashemene,) for sale either directly or through commission agents to the buyer.

Retailers: these market actors are located at the end of marketing chain, directly servicing the ultimate consumers of the marketing system. They perform numerous marketing functions

such as buying, processing, storing, selling and other functions related to marketing. Based on their location of existence are classified as regional and urban retailers

Regional retailers: these are market actors in the final link of the market chain and reside on the woreda town. They buy the teff and wheat from farmers' customer directly or through broker in the market and on their purchasing and selling verandahs on the days other than the market days.

Urban Retailers: Retailers are persons or company that sells commodity to end users (consumers and processors). They reside in the terminal market and buy the product either from wholesalers or urban assemblers or regional retailers. Terminal market retailers are characterized by owning verandahs on which buying and reselling functions are undertaken. Beside buying and selling urban teff retailers particularly residing at Hawassa often provide processing and grinding services to consumers as they own miller and processor.

Commission Agents: agent middlemen who physically handle products for buyers and sellers and paid for the service they delivered per quintal bases usually 2 to 3 birr per quintal both from buyer side as well as seller. They reside in terminal markets and do not invest their own capital. They often disseminate price and other information to the market participants and play a key role in influencing teff and wheat transaction and price information mainly in terminal markets of Hawassa, Shashemene, and Dilla.

Cooperatives: these are farmers' servce cooperative associations that supply agricultural inputs to farmers in time of production and buy farmers' agricultural output at harvest. Although existing service cooperatives received enough credits from Bureau of regional rural fund with interest rate of 1.5 percent, they are not efficient enough in terms of timely provisions of agricultural input, buying of their harvested products and financial management. The existence of farmers personnel with poor educational background are not fitting to manage the large volume of fund released from the region.

Demographic characteristics of traders

Age is one of the demographic factors that is useful to describe traders experience and networking. The age of sample traders ranged from 22 to 68 years. The average age of all

sample traders was 40.3 years and its standard deviation was 11.33 years. The average age of wheat sample traders (43.29 years) is relatively higher than teff sample traders i.e. 38.35 years. With respect to the sex, unfortunately all respondent traders were male.

Table 15 depicted that 83.7% of sample traders were married. The number of married wheat traders (88.2%) is higher than that of teff traders (80.8%). Moreover, 62.8% of sample traders were Muslim; others were orthodox and protestant Christians.

Table 15 Demographic characteristics of traders

Variables		Wheat traders	Teff traders	Total sample	t/χ^2 test
Age in years	Mean	42.69	38.89	40.3	-1.065
		(11.42)	(11.24)	(11.33)	
Sex	Male	16	27	43	
Marital status (%)	Married	88.2	80.8	83.7	2.415
	Single	11.8	19.2	15.3	
Trade experience in years					
	Mean	12.71	11.19	11.51	-0.330
		(8.72)	(8.27)	(8.35)	
Family size	Mean	5.00	4.70	4.81	-0.272
		(3.61)	(3.36)	(3.42)	
Religion (%)	Muslim	64.7	61.5	62.8	-1.343
	Orthodox	35.3	30.8	32.55	
	Protestant	*	7.7	4.65	
Education level	Mean	6.35	6.73	6.58	0.567
		(3.8)	(3.22)	(3.48)	
Ethnicity (%)	Halaba	35.3	42.3	39.5	2.415
	Amhara	23.5	23.1	23.2	
	Oromo	17.6	11.5	14	
	Siltie	11.8	7.7	9.3	
	Others	11.8	15.4	14	

Numbers in parenthesis indicate standard deviation, * indicate nil (zero)

Source own survey result 2008

Experience plays an important role in improving trading activities and marketing efficiency. The trading experience of sample traders ranges from 2 up to 34 years (Table 15). The average trading experience of sample traders' respondents was 11.51 years and the standard deviation was 8.35 years. However, wheat sample traders had higher trading experience than

teff traders. The average family size of all sample traders was 4.81 with standard deviation of 3.42. The family size of sample traders ranges from 1 and 14.

Table 15 also depicted that the educational level of sample traders ranges from grade 0 (illiterate) to 12 grades. The average educational level of the sample traders was 6.58 with standard deviation of 3.48. Based on categorization of education, the majority of traders 37.2% attended formal education ranging from grade 5 to 8 and 34.9% of traders attended from 9 to 12 grades. About 18.6% of traders attended an education level ranging from 1 to 4 grades. The remaining 9.3% of sample traders did not attain formal education; instead they attained religious schools called 'Medrasas'.

4.3. Fixed assets and working capital of Traders

The presence of fixed and liquid assets is important for smooth functioning of the marketing activities. Key players of the market require access to finance to expand their business and improve their performance. Liquid (financial) capital is needed to allow traders to capture the advantage of temporal arbitrage. This section attempts to discuss issues related to ownership of fixed and liquid assets of traders involved in teff and wheat trading activities.

4.3.1. Fixed assets of traders

Table 16 clearly depicted that about 39.6 percent of sample traders reported that they had a separate place to store their produce. And 11.6 percent of the sample traders used their residence to store the product. Average storage capacity of traders who use a separate storage facility and those who use residence as storage facility was 1,257.4 quintals and 218 quintals respectively. The chi square test indicates that there is a significant difference regarding the ownership of separete storage facility and storage facility within the residence at 10 percent significant level. Among sample traders, wholesalers and regional retailers had larger capacity storage facilities with a capacity of 1,009 and 426 quintals respectively.

With respect to telephone ownership, 83.7% and 55.8% of the sample traders' respondents had mobile and land line telephones respectively (Table 16). About 86% of the sample trader respondents had their own weighing scale while the remaining traders rented or borrowed

weighing scale from other traders. Furthermore, about 37.2% of sample wholesalers and urban retailers had their own truck.

Table 16 Ownership of fixed assets by traders

Variables	Alaba Qulito	Guba	Besheno	Qobo	Awassa	Shashemene	Arsi Negelle	Total
Separate store (Yes, %)	42.8	-	50	-	100	100	100	39.57
Storing capacity Mean (qt)	1579	-	700	-	600	200	260	1250.4
Residence store (Yes, %)	10.7	-	50	-	-	-	-	11.6
Residence storing Capacity mean (qt)	163.3	-	300	-	-	-	-	218
Mobile phone (Yes, %)	89.3	100	100	-	100	100	100	83.7
Land line (yes, %)	78.6	-	-	-	100	100	-	55.8
Truck (yes, %)	53.6	-	-	-	100	-	-	37.2
Weighing scale (Yes, %)	92.8	100	100	-	100	100	100	86

Source survey result 2008 *indicate the value zero

4.3.2. Traders financial resource ownership

Table 17 revealed that the average nominal value of current working capital of sample traders (Birr 119,325.6) was much higher than their initial working capital of Birr 6,960.5. The initial average working capital of traders ranged from Birr 200 to 45000 with the average amount of Birr 6,960.5. Likewise, the amount of traders' current working capital ranged from Birr 4,000 to 650, 000 with an average amount of Birr 119,359. Furthermore, 72% sample traders used their own capital for trading activities, where as, 18.6%, 2.3% and 16.3% of sample traders took loan from commercial banks, MFI and informal sources respectively.

Table 17 Sources and size working capital of sample traders

Variables	Alaba Qulito	Guba	Beshen o	Qobo	Awass a	Shashe mene	Arsi Negelle	Total
Initial working Capital								
Mean	7746.4	2125	1800	1175	45,000	11,000	6,000	6,960.5
Minimum	500	500	200	100	45,000	11,000	6,000	200
Maximum	44,000	4,000	4,000	1,500	45,000	11,000	6,000	45,000
Current working capital								
Mean	147,000	17,000	16,750	6,250	650,000	85,000	120,000	119,359
Minimum	4,000	5,000	5,000	5,000	650,000	85,000	120,000	4,000
Maximum	420,000	30,000	30,000	7,000	650,000	85,000	120,000	650,000
Source (yes, %)								
Own	57.1	100	75	100	100	100	100	72
Bank	17.9	-	-	-	100	100	100	18.6
MFI	3.6	-	-	-	-	-	-	2.3
Informal sources	21.4	-	25	-	-	-	-	16.3

Source survey result 2008,– indicate the value zero

4.4. Teff and wheat marketing channel

According to Mendoza (1995), marketing channel is the sequence through which the whole of teff and wheat passes from farmers to consumers. The analysis of marketing channel was intended to provide a systematic knowledge of the flow of the goods and services from its origin of production to the final destination of ultimate consumers. During the survey, the following teff and wheat marketing channels were identified.

During the meher production season of the year, the estimated total production of teff and wheat in the study area was 93,164.6 and 71,356.7 quintals respectively (CSA, 2007). Out of these total production the respective teff and wheat marketed was 80,308 (86.2%) and 35,107 (49.2%) quintals. As clearly depicted in the figure 2 and 3, the teff and wheat market channels constructed based on the data collected from seven different markets. The survey result obtained revealed that eight and ten marketing channels of teff and wheat were identified respectively. Although the actual marketing channels are more complicated, the main marketing channels of the seven different markets based on quantity flow of teff and wheat from producers to consumers through different intermediaries for both commodities are described.

Marketing channels of teff: the marketing channels of teff identified below shows how commodity teff passes through eight complicated routs of intermediaries on the way from point of origin (producers) to reach ultimate users (consumers). From the figures 2 depicted, one can understand that the main receivers of teff from the producers were urban assemblers, wholesalers and regional retailers who possess estimated percentage of 40, 37.4 and 16.5 respectively. The rest 6.1 percentage was received by farmer traders, cooperatives and direct transaction between farmers to consumers. Based on the volume of teff flown, the marketing channels were compared with each other. Accordingly, the producer-wholesaler-urban retailer- consumer channel, (channel 3) carries the larger volume of teff transacted followed by producer-urban assemblers-wholesalers-urban retailers-consumer channel, (channel 4).

The major identified channels of teff during the survey were explained as follows

Channel 1 producer-consumer
Channel 2 producer-regional retailer-consumers
Channel 3 producer-wholesaler-urban retailer- consumers
Channel 4 producer-urban assembler-wholesaler-urban retailer-consumers
Channel 5 producer-urban assembler-urban retailer-consumers
Channel 6 producer-farmer trader-wholesaler-urban retailer-consumers
Channel 7 producer-urban assemblers-regional retailer-consumers
Channel 8 producer-cooperatives (union)-NGO (UNDP)-consumers

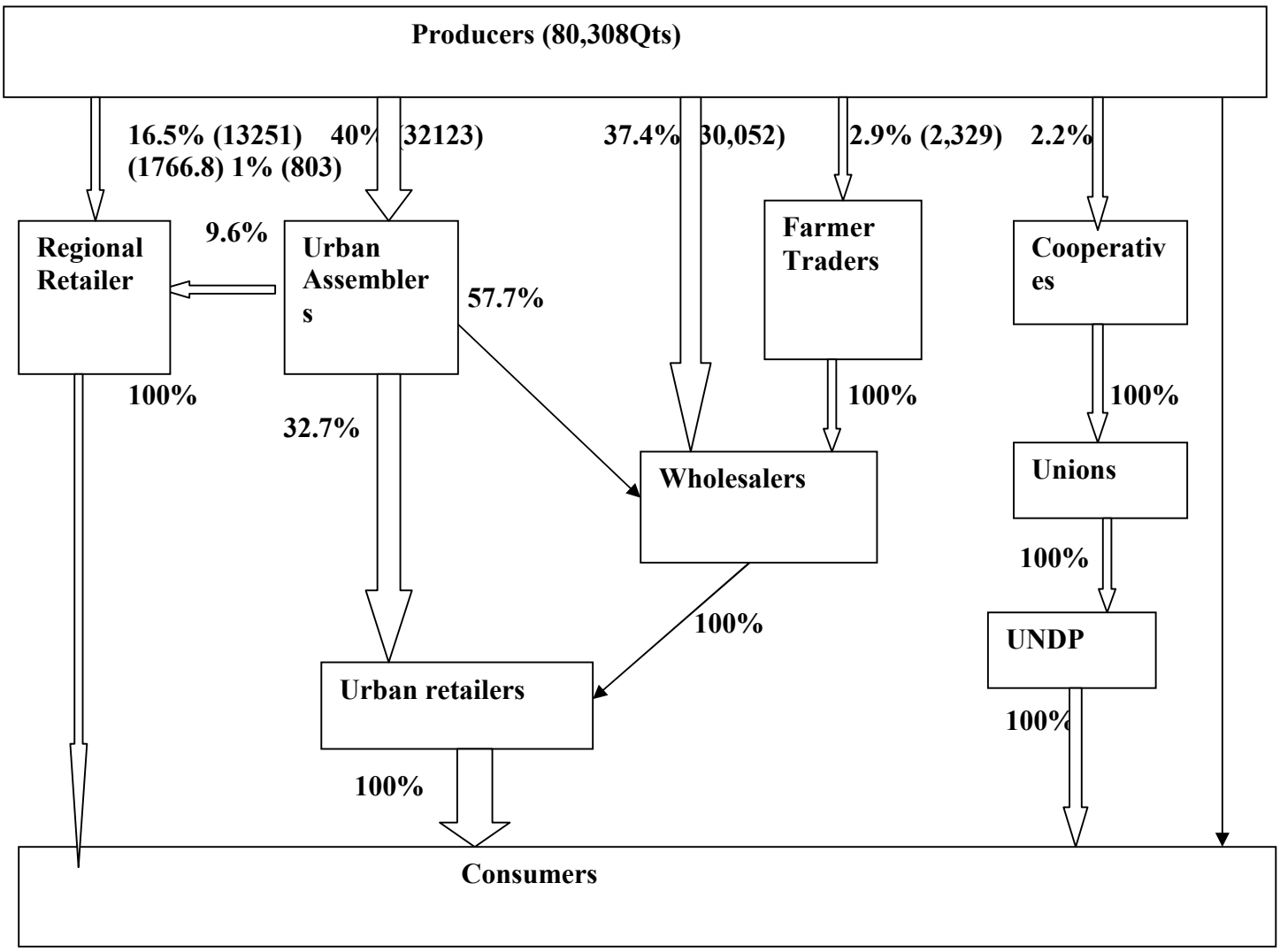

Figure 2 teff marketing channels

Source survey result 2008

Wheat marketing channels: commodity wheat has a bit higher complexes numbers of marketing channels than teff. It passed through ten different channels in the way to reach the ultimate consumers. As one can see from the figure 3, the main receivers of wheat from the farmers are wholesalers and urban assemblers who received the estimated percentage of 45.1 and 43.8 respectively. The remaining 11.1 percentage was received by farmer traders, regional retailers and directly from farmers to consumers. And computation was made based on the volume of wheat flown in the marketing channels. Accordingly, the producer-wholesaler-urban retailer-processors-consumer channel carries the larger volume of wheat

transacted followed by producer-urban assemblers-urban retailers-processors-consumer channel. Processors in wheat marketing channel represent flour mills owners who buy only quality wheat and those local alcoholic drink 'Areke' distillers who require lesser quality wheat.

The identified ten different wheat marketing channels are listed below as follows

Channel 1 producers-consumer
Channel 2 producers-regional retailers-consumers
Channel 3 producers-wholesalers-urban retailers-consumers
Channel 4 producers-wholesalers-processors
Channel 5 producers-urban assemblers-wholesalers-urban retailers-consumers
Channel 6 producers-urban assemblers-wholesalers-urban retailers-processors
Channel 7 producers-urban assemblers-urban retailers-consumers
Channel 8 producers-urban assemblers-urban retailers-processors
Channel 9 producers-farmer traders- wholesalers-urban retailers-consumers
Channel 10 producers-farmer traders-wholesalers-urban retailers-processors.

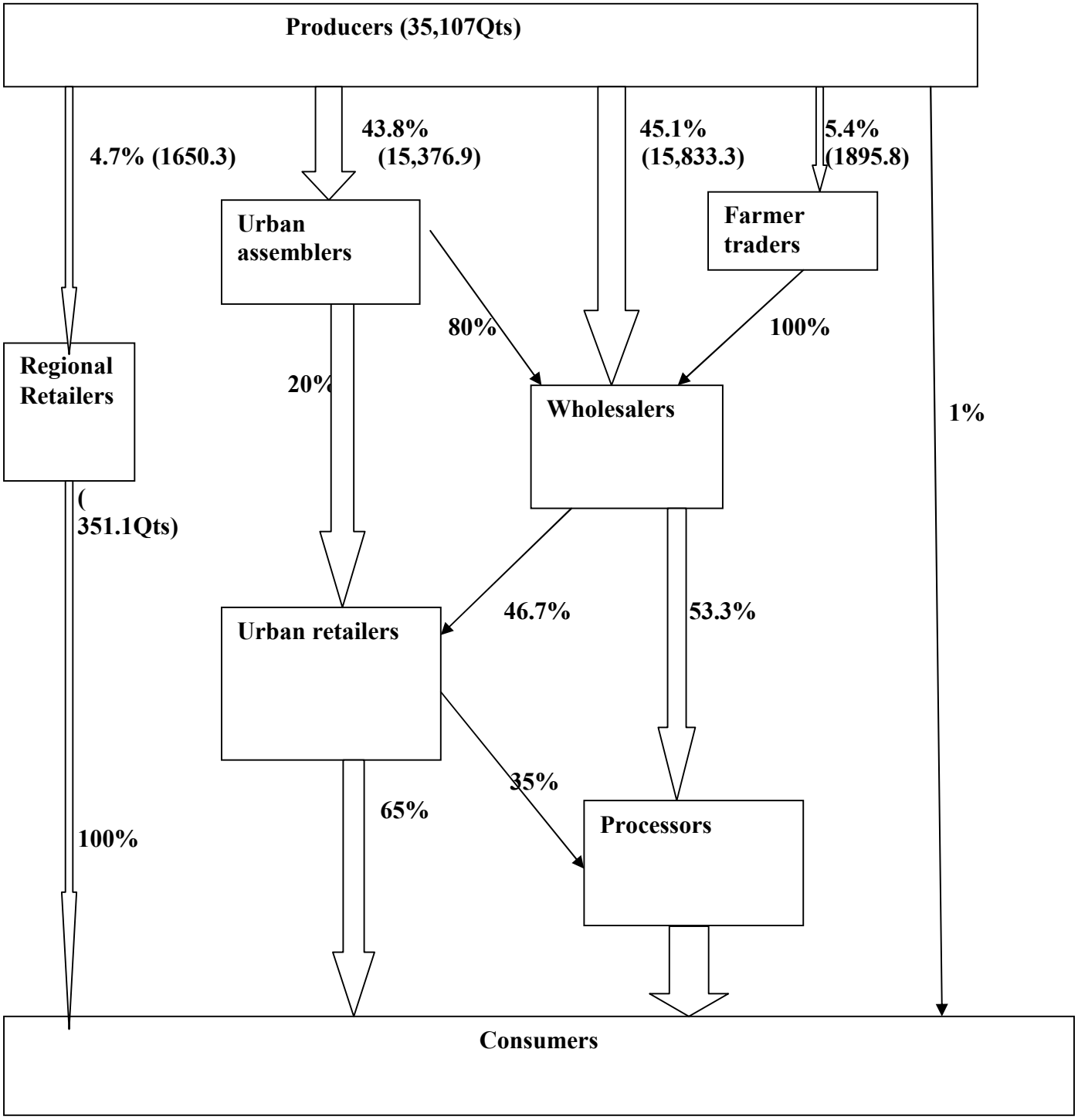

Figure 3 wheat marketing channels

Source survey result 2008

4.5. Analysis of structure conduct and performance of teff and wheat

4.5.1. Structure of the teff and wheat market

The structure of the teff and wheat marketing system should be evaluated in terms of the degree of market concentration, barrier to entry (licensing procedure, lack of capital and know how, and policy barriers), and the degree of transparency (Pender *et. al* 2004). In this study the structure of the teff and wheat market is characterized using the following indicators: market concentration, the degree of transparency (market information) and entry conditions (licensing procedure, lack of capital and know how).

4.5.1.1.Degree of market concentration

According to Kohls and Uhl (2002) Market concentration, the portion of the industry sales made by the largest firms, is another source of imperfect competition. Successful competitors frequently eliminate their rivals or discourage new firms entry, contributing to more concentrated markets. In general, the higher the level of market concentration, the less perfectly competitive the market is.

The concentration ratio is expressed in terms of CRx, which stands for the percentage of the market sector controlled by the biggest X firms. Four firms (CR4) concentration ratio is the most typical concentration ratio for judging the market structure (Kohls and Uhl, 1985). A CR4 of over 50% is generally considered as strong oligopoly; CR4 between 33% and 50% is generally considered a weak oligopoly and a CR4 of less than 33% is un concentrated market.

The teff and wheat market in the study area showed concentrated buyers. The analysis of the degree of market concentration was carried in Alaba Qulito market, where wholesales of the two commodities were significantly involved. Concentration ratio was estimated by taking annual volume of teff and wheat purchased in 2007/08 by sample traders (Halaba special woreda). The survey result revealed that in Alaba Qulito market teff and wheat trading was dominated by few traders (Table 18).

Table 18 Concentration ratio for Alaba Qulito market

Sample market	Commodity	Concentration index top four traders
Alaba Qulito	Teff	65
	Wheat	71.5

Source survey result 2008

Table 18 depicted that the four largest teff and wheat traders possess 65 and 71.5 % of the total volume of purchase in Alaba Qulito market respectively. Based on the rule thumb of market structure criteria suggested by Kohls and Uhl (1985) the teff and wheat market in Alaba Qulito showed an oligopolistic market, indicating the existence of market imperfection.

4.5.1.2. Degree of market transparency

It is widely accepted that, accurate and timely market information enhances market performance by improving the knowledge of buyers and sellers concerning supply and demand. Exclusive access to market information or the control or concentration of information asymmetry and concentration of capital at the disposal of very few traders is important sources of monopoly which affects the nature of horizontal and vertical relations. More balanced knowledge of the markets provides a fair distribution of the gains from efficient market price formation (Timmer *et al,* 1983).

However, even though information plays such a crucial role in improving the marketing system, there was no organized system to provide reliable market information to all market participants in the study area. Hence, traders used different approaches to access market information. According to the survey result, about 42% and 19% of sample traders obtained price information through telephone and from other traders in the market respectively. The remaining 39% of traders reported that they obtained price information through telephone, brokers, discussion with other traders, and personal observation. Although, Medias such as television and radio play the greatest role in provision of market information in shortest possible time over larger area of coverage, its effect in addressing grain market information to users was very limited. Despite the fact that, no trader had accessed mass Medias as an information source.

Since sources and means of obtaining information by different categories of traders varied significantly, the timeliness and quality of information obtained depends on the traders'

access to market information channels and their individual judgment on the level of supply, demands and prices collected from different sources and in different times. Despite the fact that about 63% of traders showed their willingness to pay for the information cost provided that there are well organized and transparent information providing centers, they still complained that, market information is one of the major problems they faced in trading teff and wheat in the study area.

4.5.1.3.Barrier to entry

Licensing: In Halaba special woreda, all traders had trade license with the exception of traders residing in small rural markets of Besheno, Qobo and Guba markets. According to the information obtained some key informants in Alaba Qulito Town Small Scale, Trade and Industry Office, there were 72 traders licensed on the bases of the amount of initial capital they possessed. There are two types of licenses in the special woreda; those who have an initial capital of 10,000 Birr classified as wholesalers. They can purchase teff and wheat in regional markets and transport it to the deficit terminal markets (Hawassa, Shashemene, Dilla etc). Those who received a license with initial capital of 300 Birr are licensed as retailer/urban assemblers and can purchase and sell grain with in the regional markets only.

However, from the sampled respondent 70.4% of teff and 75% of wheat traders (all traders residing in the town) have grain-trade license where as the remaining 29.6% of teff and 25% of the sample farmer traders who reside in rural markets had no grain-trade license. According to the survey result all traders having grain-trade license and residing in the town reported that it is very simple to get grain trade license, so long as they fulfill the required initial capital not verified by the office.

Although, theoretically it is compulsory to have license to enter in to the grain market, the simplicity to have grain license and absence of strong restriction to enter into the grain market with respect to licensing made grain marketing relatively free to enter. Thus, entry in to teff and wheat trading is easy.

Capital: According to the survey result, about 95.4% of the sample traders identified that lack of capital is one of the major entry barriers to enter in to teff and wheat trading. In addition, the sample traders reported that lack of access to credit has bean the single most critical

constraint in the start-up and expansion phases. About 62.8% and 16.3% of sample traders were using their own capital and borrowing from other traders and friends respectively. The rest 20.9 percent of traders (mainly wholesalers) had access to formal financial sources to expand their trading activities. Thus, access to capital was one of the major factors discouraging entry into grain trading.

Lack of trading experience: according to the survey result, trading experience of sample traders ranges from 2 to 34 years with an average experience of 11.5 years. The presence of wider range of experience years among traders indicates that experience is not a barrier to enter into grain market.

4.5.2. Conduct of teff and wheat trading

Market conduct refers to firm's behavior for example pricing and selling policies and tactics, overt or tacit inter firm cooperation, or rivalry, and product or market related research and development activities (Scarborough and Kiddy, 1992). In this section the conduct of teff and wheat traders is analyzed in terms of the producer and trader's price setting, purchasing and selling strategies.

4.5.2.1. Producers Price setting strategy

According to the survey result, about 49% of sample farmer respondents reported that market price was set through negotiation and haggling with traders. And 37.5% respondents reported that price was set by the market. The remaining 11.5% and 2% of farmer respondents reported that the selling price of their produce was set by themselves and traders respectively. The survey further confirmed that, about 51.6% of sample respondents face problem of low price after they took the product in to the market. And 72.6% of sample respondent farmers reported that they took their product back to home and waited till next market day. The other 17.2% of sample respondents sold their product with the existing price. The remaining 10.2% put their produce in homes of their relatives on market place to be sold some other day other than the market day. The majority of farmers identified that price was the major determining factor that affect their decision as to whom and which market to sell their produce. Hence, there existed absence of competitive pricing system, indicating the deviation of market from the competitive market norms.

4.5.2.2. Buying and selling strategy of traders

Generally, grain trading is based on eye appraisal of the commodities and exchange takes place on bargaining. The strategies of traders in maximizing profit and develop bargaining power include the use of regular partner, long term relation with clients or suppliers, the use of intermediaries, trading with personalized network, availability of market information and its impact on price, feasibility of alternative market outlets and price setting practices etc.

Based on the data from sample trader's survey, about 69.7% and 14% of respondents reported that buying price was set by the market and discussion with other traders respectively. The rest 9.3% and 7% of sample traders reported that market price was set by negotiation with suppliers and by traders themselves respectively.

According to the survey result, the number of market visited per week by the sample traders during purchase ranges from 1 to 4 markets. And the average number of markets visited per week by all traders was 1.43 with standard deviation of 0.74. As clearly presented in Table 19 urban assemblers visited the highest average number of market per week (2.25) followed by wholesalers (1.58).

Table 19 Number of markets visited by traders per week

Trader type	Average market number visited per week
Farmer traders	1
Urban assemblers	2.25
Wholesalers	1.58
Urban retailers	1
Regional retailers	1
Total	1.43

Source survey result 2008

On other hand, the survey result revealed that about 83.7% of traders responded that selling price was set by negotiation with buyers of the product they offered. While the rest 9.3% and 7% of the respondents said that selling price was set by buyer and the market respectively. Moreover, about 93% and 7% of sample traders consider supply and demand and nearby market prices to determine the purchase and selling price of the market respectively.

Traders used different marketing agents to sell their product in the market. Based on the survey result about 69.8% of sample traders reported that they personally in charged to sale. Where as 11.6% and 4.6% of traders used the service of their family member and commission agents at time of sale. The rest 14% of traders sold their product through combination of themselves with commission agents.

With regard to the payment mode while sample traders sold their product, the survey result depicted that about 42% of sample traders (more of wholesalers) sold their product on cash and credit. Around 30.2% of traders particularly of farmer traders and urban assemblers sold their product through cash only. Few of the traders 4.6% sold though credit. And the remaining 23.2% of sample respondents sold their product though combination of cash, advanced payment and credit.

4.5.3. Analysis of market performance

Marketing performance of teff and wheat markets were analyzed by estimating the marketing margin, by taking into consideration associated marketing costs for key marketing channels. Based on production costs and purchasing prices of the major market participants along the chain, margins at farmer, urban assemblers, wholesalers and urban retailer's levels were estimated and analyzed.

Marketing margin

Marketing margins are the difference between prices at two market levels. The term market margin is most commonly used to refer to the difference between producer prices of an equivalent quantity and quality of a commodity. However, it may also describe price differences between other points in the marketing chain, for example, between producer and wholesale, or wholesale and retail, prices (Spencer, 1971). Marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. The margin covers costs involved in transferring produce from one stage to the next and provides a reasonable return to those doing the marketing. It can be interpreted as a cost of providing a mix of marketing services.

Therefore, in these two commodities of teff and wheat marketing margins were analyzed based on the average sale price of different marketing agents in the marketing channels of producers, urban assemblers, wholesalers and urban retailers. To give detail information on analysis of marketing margins of the two commodities (teff and wheat), analysis of the marketing margins of the commodities were carried out separately. Table 20 depicts that the different marketing margins of teff marketing channels described as follows.

Table 20 Teff marketing margin (%), selling price, and marketing costs and profit (birr/qt)

Marketing actors	Selling price	Marketing/production cost	% Gross marketing margin	Profit
Producers	385.61	187.35	78.7	198.26
Urban assemblers	410.75	15.14	5.13	10.61
Wholesalers	450	27.94	8	4.33
Urban retailers	490	22.75	8.17	20.35

Source survey result 2008

TGMM (along all channels) =21.3%

GMM_{UA} = 5.15%

GMM_{WS} = 8%

GMM_{UR}= 8.17%

GMMP (producers participation) = 100%-TGMM = 100%-21.3%=78.7%

As presented in Table 20, the total gross margin added to teff price when it passes through the marketing system was 21.3%. The farm retail or consumer price which are accrued to each category of participants in return for the marketing services which they perform other than farmers in percentage terms of urban assembler, wholesalers, urban retailers were, 5.31%, 8% and 8.17% respectively.

The farmer's share of the price to end user was 78.7%. Urban assemblers receive smaller percentage of the consumer price (5.31%). Regional wholesalers and urban retailers however, received relatively similar percentage of the consumer's price. (Table 20)

The different marketing margin of wheat marketing actors along its channels was described in Table 21 as follows

Table 21 Wheat marketing margin (%), selling price, marketing cost, and profit (birr/qt)

Marketing actors	Selling price	Marketing/production cost	%Gross marketing margin	profit
Producers	270.84	110.04	74.2	160.8
Urban assemblers	292.5	18.92	5.93	2.33
Wholesalers	304	23.6	3.17	10.77
Urban retailers	365	17	16.7	28

Source own survey result 2008

TGM_M (along all marketing channels) = 25.8%

GMM_{UA}=5.93%

GMM_{WS}= 3.17%

GMM_{UR}= 16.7%

GMM_P (producers participation) = 100%-TGMM= 100%-25.8%= 74.2%

According to Table 21, the total wheat gross marketing margin that was added to wheat price, while passing through marketing system to reach final destination (consumers) was 25.8%. And out of the total gross marketing margin of wheat, 25.8%, urban retailers received the highest of all marketing agents which is 16.7%. The remaining 5.93% and 3.17% of marketing margin were received by urban assemblers and wholesalers respectively along different channels. Furthermore, wheat producers share in consumer price was 74.2%.

4.6. Analysis of teff and wheat profitability

4.6.1. Producers' profitability analysis

Whenever profitability analysis of any activity is under taken, production costs and revenues (benefits) obtained must be included in the analysis. In the case of teff and wheat, production costs are costs related to production and production process. In economics terms these costs are termed as either fixed or variable costs a farmer incurred in the production and production process of teff and wheat. Fixed costs are costs that do not change with a change in output (production). On the other hand fixed costs simply mean costs incurred regardless of the presence or absence of production. Land rent, oxen rent are some of the fixed costs a farmer incurred in the study area. However, variable costs are costs that are liable to change with a change in production. These are costs of fertilizer, seeds, chemical herbicides, labor costs etc

First, in order for sample farmers understood well the detailed production cost structure and profitability of teff and wheat production, data were collected on the bases of 'timad' unit which is equal to quarter of a hectare. Later on for the purpose of data analysis and readers understanding the 'timad' units were converted in to hectare so that it can fulfill the standard unit of measurement**.**

As presented in Table 22, the survey result indicated that the average productivity of teff and wheat production in the survey area was 7.63 and 19.05 quintals per hectare respectively. The average cost of production per hectare was Birr 1428.58 (187.35 ETB per quintal) for teff and Birr 2096.32 (110.04 ETB per quintal) for wheat. In order of importance, the major costs incurred by sample farmers in the woreda for production of teff were land rent (21.4%), fertilizer purchase (20.2%) and oxen rent (10.6%). Likewise, seed purchase (21.4%), fertilizer purchase (19.2%) and land rent (15.1%) were major costs incurred for the production of wheat.

The total revenue obtained from the production of teff and wheat per hectare was simply estimating the amount of teff and wheat produced multiplied by a corresponding average price a farmer received in the production year. The total revenue a sample farmer owned from hectare of land from production of teff and wheat was Birr 2940.39 and 5159.5 respectively. Subtracting the average production costs from the value of total revenue it would reach positive net revenue of Birr 1511.81 (198.26 ETB per quintal) and 3063.18 (160.8 ETB per quintal) for teff and wheat per hectare respectively. This showed the profitability farm business. Here, the net return obtained by wheat producing farmer was as twice as that of teff producing farmers. Higher productivity and profitability made wheat production more competitive implying that the need for encouragement of wheat production in the study area from economic as well as food security perspective.

Table 22 Cost structures and profitability of sample farmers (Birr per ha)

Lists of Expenses	Sample Teff respondents N=80	Sample wheat respondents N=80	% teff	% wheat
Land clearing	34.50	6.59	2.4	0.3
Plowing	88.04	93.06	6.2	4.4
Seed	109.49	447.50	7.7	21.4
Fertilizer	288.95	403.54	20.2	19.2
Sawing	78.28	73.98	5.5	3.5
Weeding/herbicides	35.96	39.61	2.5	1.9
Harvesting/collection	118.95	175.76	8.3	8.4
Threshing & winnowing	122.38	188.39	8.6	9
Sack	25.94	52.96	1.8	2.5
Land rent	305.38	315.50	21.4	15.1
Oxen rent	151.71	190.44	10.6	9.1
Transportation	23.55	50.07	1.6	2.4
Loading unloading	6.81	9.78	0.5	0.5
Laborers feed	38.64	49.14	2.7	2.3
Total cost **(A)**	1428.58	2096.32	100	100
Average qt produced	7.6253	19.05		
Average price/qt	385.61	270.84		
Total revenue **(B)**	2940.39	5159.5		
Net revenue **(B-A)**	1511.81	3063.18		

Source own survey result 2008

4.6.2. Profitability analysis of teff and wheat traders

Table 23 clearly depicted analysis of profitability of the different traders of teff and wheat namely farmer traders/rural assemblers, urban assembler, regional wholesaler, regional retailer, and urban retailers described in detail across the markets. During analysis of profitability, the average purchased price of a quintal of the commodities (teff and wheat) and the different average transaction costs associated with the marketing process of a single quintal till it reached the next dealer was assessed.

As a survey result indicates, the amount of average transaction costs incurred across traders varies. Accordingly, the total costs incurred by farmer traders, urban assemblers, regional wholesalers, regional retailers, and urban retailers of teff were Birr 5.89, 15.14, 27.94, 5.4 and 22.75 respectively. And it was Birr 2.16, 18.92, 23.6, 25.33, and 17 for whaet farmer traders, urban assemblers, regional wholesalers, regional retailer, and urban retailer in the same order

until possession is transferred to the next marketing agent. Since buying and selling of the product by farmer traders had taken place on their nearby village market, they were not liable to different costs associated with marketing process. As a result, Farmer traders exercised lowest average transaction costs per quintal than any other traders. The survey result also indicated that the amount of transaction costs per quintal incurred by regional wholesalers for teff was Birr 27.94 and Birr 23.6 for wheat. Wholesalers transaction cost was higher than any other sample trader type of the two commodities. This could be due to higher costs related to transportation of the product and storage loss during product preparation.

With respect to the profitability of the two commodities, the overall average profitability of teff and wheat across the different markets indicate that at every stage of transaction, trading business was profitable. However, Table 23 revealed that urban retailers were traders who obtained the highest net profit per quintal than that was 20.35ETB for teff and 28ETB for wheat. Regional wholesalers obtained least net profit per quintal both for teff and wheat. This might be due to wider and higher transaction costs associated with the marketing process. Nevertheless, their lower net profit could be compensated through transaction of higher volume of commodities.

Table 23 Analysis of profitability of teff and wheat traders (Br/Q)

Lists of average costs	Farmer traders		Urban assemblers		Regional wholesaler		Regional retailer		Urban retailers		Total	
	Teff	wheat	Teff	Wheat	Teff	wheat	Teff	wheat	teff	Wheat	teff	wheat
Purchase price	380	258.33	385	271.25	417	269.63	425	273.33	447	320	405.93	271.56
Sack price	1.53	-	2.38	2.5	3.13	3	2.5	3.33	5	4	2.69	2.6
Fill, weigh and stitch	1.07	0.83	1.5	1.38	1.83	2	1	2	2.4	3	1.57	1.62
Loading unloading	-	-	1	1.25	1.96	2	-	1.67	-	-	1.02	1.1
Transportation	-	-	3.5	4.75	9.25	10	-	8	-	-	4.63	4.93
Processing	-	-	1	0.5	2.58	1.8	-	2.33	6	2	1.74	1.56
Storage	-	-	0.63	0.63	0.26	0.48	0.9	-	-	-	0.27	0.29
Storage and other losses	-	-	3.05	3.35	4.37	1.02	-	3.33	3	4	2.61	2.4
Infrastructure	-	-	0.75	1.75	1.92	1.6	1	1.67	2.5	1	1.22	1.26
Permanent and temporary workers	3.29	-	0.5	1.25	1.17	1	-	1	1.75	1	0.72	0.78
Other costs	-	1.33	0.83	1.56	2	0.7	-	2	2	2	2.01	1.77
Selling price	400.7	266.67	410.75	292.5	450	304	445	306.67	490	365	434.4	383.8
Net profit	14.8	6.18	10.61	2.33	4.53	10.77	14.6	8.01	20.35	28		

-Indicate nil (zero), Source own data computation 2008

4.7. Major problems and opportunities

4.7.1. Production and marketing problems of farmers

The farm problems of sample farmer households are usually associated with unstable and relatively lower prices and incomes. Despite the current volume of teff and wheat produced and offered to the market, farmers face a number of problems in the production and marketing process. Based on farmers' perception the major production and marketing problems reported were rain failure, soil erosion, higher fertilizer price and delayed delivery, prevalence of disease, access to credit, poor extension support services, lack of draft power, labor shortage, unfair pricing and scaling (weighing), lack of market information providing institutions, multiple taxation, and chemical herbicide adulteration (Table 24).

4.7.1.1. Farmers' production problems

Rain failure: agricultural production is to a greater extent dependent on weather and biological pattern of production. The majority of the respondents reported that their major production problem is attached to rain failure. Farmers on an average face rain failure once in every three years. The result presented in the table 24 also revealed that 97.5% of teff and wheat producing sample households face production problem due to rain failure. The study area being moisture stressed and its agricultural production is exclusively dependent on natural rain needs special attention. Diversification is the only risk management production strategy smallholder farmers adopted to cope with their increasing volatile production and productivity.

Higher fertilizer price and delayed delivery: although application of fertilizer plays an important role for farmers to increase production and productivity, however price escalation of fertilizer together with limited access to credit has forced farmers to use lower quantity of fertilizer. Beside this untimely delivery of fertilizer by WOARD was also causing a serious challenge to the farmers. Thus, the increase in the price of fertilizer and untimely delivery made farmers not only to use lower quantity of fertilizer but also forced them to switch to private dealers where there is no assurance of the quality. This, intern resulted in lowering

yield and marketed surplus. Thus, the higher price and untimely delivery requires due attention by the government.

Soil erosion; Conserving the fertility of the soil plays positive role in increasing the production and productivity, thereby marketable surplus to flourish. On top of the technologies, like application of fertilizer that increase production, the protection of soil erosion which to maintain the already existed fertility of the soil plays a critical role in increasing production. According to the report of sample farmers in the study area, problems related with the soil erosion reduce production and marketed surplus.

Labor shortage: labor being a factor of production plays constructive role in increasing production and productivity of teff and wheat. As sample respondents reported that labor shortage was very crucial particularly during land preparation and harvest of crops. Thus, absence of sufficient labor force in the family made some farmers to hire additional labors and others form labor cooperation with neighborhood farmers locally known as 'Geza'

Lack of credit access: although the availability of credit is important source of cash for farmers to buy agricultural inputs needed to increase production and marketed surplus of teff and wheat. Only few of the respondents accessed credit from formal sources. As a result farmers were forced to use input below the recommended rate.

Draft power: oxen are important power source smallholder farmers endowed with for production of agricultural crops. In the study area farmers reported that absence/shortage of oxen resulted in delayance in production and attaining of lower yield.

Prevalence of crop diseases: prevalence of disease was one of the production problems encountered by farmers in the study area. Based on its occurrence, the most commonly occurred diseases were rust for teff and wheat and root rot for the case of teff only.

4.7.1.2. Farmers' marketing problems

Unfair pricing and cheating of traders during weighting: farmers in the study area were frequently liable to cheating in weighing scale while selling their product in the market. The case was particularly intense at time of peak supply or harvesting season, where sample farmers sell in bulk. In the mean time, the price traders offered to farmers was low, without actual interaction of supply and demand in the market. In addition to this, the cheating of traders in weighing the produce forced farmers to weigh their produce some other place prior

to marketing. This additional weighing of the produce brings extra cost to farmers after harvest. To avoid such a problem of cheating in weighing and to have better price farmers prefer to sell their produce to consumers directly.

Lack of market information providing institutions: the presence of market information providing institution is important in increasing the efficiency and effectiveness of marketing activities. Provision of market information plays a greater role in farmers' decision making process. This made farmers to reduce risks and uncertainties associated with the market and made them to take the right decision. However, the absence of this information providing institution in the study area made farmers pay price for marketing.

Table 24 Production and marketing problems of farmers (%)

Lists of problems	N=80 Teff producers	N=80 Wheat produces	N=160 Total sample
Rain failure	100	95	97.5
Higher fertilizer price & delayed delivery	81	90	85.5
Soil erosion	30	67.5	49
Credit access	83.8	89	86
Drought power	14	22.5	18
Labor shortage	15	35	25
Unfair pricing, and scaling	63.8	45	54
Market information	45	77.5	61.3
Multiple Taxes	66.3	27.5	47
Input price	81	90	85
Herbicide adulteration	27.5	42.5	35

N= Farmers' sample size. Source own survey 2008

Multiple Taxes: according to the report of sample respondents, beside taxes related to farm production, the presence of municipality tax made farmers to incur additional cost while offering the harvested product to the market. Of the total sample respondents 47% of interviewees reported that municipality taxation was one of the marketing problems they faced during provision of products to the market.

Higher input price: the increasing price of agricultural inputs in the woreda is not only the production but it is also marketing problem farmers faced while buying agricultural inputs in

the market prior to production. Thus 85% of the total sample respondents reported that they face higher input price.

Chemical herbicides adulteration: absence of licensed chemical herbicide supplier in the area made farmers to buy chemical herbicides from local private dealers. The presence of unethical traders offer expired and home made forgery chemical herbicide to the market. Farmers that bought adulterated herbicide will be obliged to buy supplementary herbicide. Of the total respondent, 35% of sample farmers in the study area reported that they face problem of herbicide adulteration (Table 24).

4.7.2. Marketing problem of traders

The major marketing problems sample traders faced in the study area were capital shortage, credit access, poor product quality of the commodity, lack of market information, multiple taxation, higher transportation cost, lack of demand and unfair competition with unlicensed traders.

Table 25 clearly depicts that about 81% of sample traders faced capital shortage to conduct and expand their trading activities. Capital shortage was mainly due to lack of credit access. Provision of quality products by farmers to the market were followed by better prices, however, about 77% of sample traders reported the presence of products quality problem in the study area. This was particularly due to absence of extension support after harvest. Thus, the problem made farmers to accept lower prices unlike the neighboring farmers producing the some product. Attention to integrated extension system that can accommodate grain marketing is very important.

The other traders' problem in the study area was absence of road service in rural markets. In the woreda, village markets are connected to town markets by dry weather poorly paved roads. As a result, animal driven carts and pack animals are the most frequently used transport means to transport larger loads. Almost all of the roads to the village markets are difficult for vehicles during rainy season. About 65% of sample traders reported the existence of transportation problem. Village markets of Besheno and Qobo are very rugged and inaccessible to vehicles during rainy seasons. It is only Isuzu trucks that best adapted to the

existing road to move goods from place to place. About 63% of the sample traders reported that poor road access made them to incur higher transportation cost.

Lack of access to credit was one of the marketing problems limiting operation and expansion of trading activities in the woreda as reported by sample traders. The problem in accessing credit was mainly related to religious factor as most of traders in Halaba are Muslims in their religious background, they did not like to take loan with interest. The other reasons were absence of collateral, high interest rate of MFI. In addition, absence of municipality for traders having collateral in the market place of Besheno and Qobo is one reason for traders not taking loans from banks as collaterals confirmed by municipality are conditions to access credit from banks. Because of these reasons, about 79% of sample respondents did not obtain any credit from financial institution.

Table 25 Major marketing problems of traders

Lists of problems	N=27 Teff traders	N=16 Wheat traders	N=43 Total sample
Capital shortage	81.5	81.3	81.4
Credit access	74.1	87.5	79
Poor product quality	77.8	75	76.7
Market information	74.1	68.8	72.1
Infrastructure	66.7	62.3	65.1
Multiple Taxation	66.7	62.5	65.1
Transportation cost	59.3	68.8	62.8
Lack of demand	48.2	75	58.1
Unfair competition with unlicensed traders	37	50	42

N= sample size, Source own survey result 2008

As presented in Table 25, about 65% of sample traders reported that that they incur municipality charge and inland revenue, multiple and double tax. And about 58% of sample traders lacked demand due to limited number of buyers, quality problem, and poor road and transportation problems.

Market information is a market facilitation function that plays greater role in improving marketing decisions of traders through avoiding or reducing of information asymmetry. However, about 72% of traders face lack of market information providing institution although

they were willing full to pay for the required information. Lack of uniform controlling mechanism to enforce unlicensed grain traders to have license is marketing problem in the woreda. About 42% of sample traders reported that there is absence of government control on unlicensed traders (Table 25).

4.7.3. Opportunities

The study area has not only problems associated with production and marketing there is also diversified opportunities that need to be exploited. Consequently, production and marketing efficiency and effectiveness could be increased. Among the different opportunities that prevailed, the majors are tried to be mentioned as follows.

Suitability of the area for production; it is the area endowment with fertile soil type for agriculture, peoples ready to accept new technologies, the presence of perennial rivers for irrigation, farmers having better land holding than the average Ethiopian farmer, and plain topography are some of natural endowment opportunities the woreda had. These opportunities are important for the growth of grain crops, vegetables and other perennial crops like fruits. Furthermore, as a mixed farming experiencing area the above mentioned opportunities also have potential contribution for livestock production..

The other potential opportunity of the area is its proximity to highly populated and newly booming towns like Hawassa, Shashemene, Dilla and other surrounding nearby towns as Wolita creates potential demand for the products produced in the area. Obviously the increased demand would be followed by better farm price for producers. As a result farmers will have an incentive to expand their output. Furthermore, the increasing food processing plants in and around Alaba Qulito town is creating additional demand for agricultural commodities like wheat. Consequently, this contributes for commercialization of rural economy and creates many off-farm jobs opportunities.

Government suitable agricultural policies designed to support farmers at the grass-root level is the other opportunity dimension. Administrative decentralization and the deployment of development agents at each PAs based on their academic background are also important policy dimensions. Furthermore, provision of infrastructure facilities like roads, telecommunication (mobile, wireless, and optic fiber), power supply and financial institutions

as Banks, MFI (Omo) are the infrastructural advantages that facilitate the production and marketing of teff and wheat in the study area.

The other opportunity the area possess is the presence of NGOs working on development projects like IPMS/ILRI played key role in identifying potential agricultural commodities grown in the area, giving training and creating linkage among different marketing stakeholders, establishing knowledge centre that facilitate knowledge sharing among peoples of different background, and displaying weekly market price information on notice board at different markets. Moreover, marketing researches and development practices under taken by post graduate students funded by the project are worth to mention.

4.8. Analysis of Econometric Results

The econometric analysis was planned to investigate factors affecting, volume of teff and wheat supply to market. The analysis was undertaken for teff and wheat independently.

4.8.1. Determinants of teff and wheat market supply

In the study area, production of teff and wheat are mainly for market and are important cash commodities next to red pepper. Data collected from sample respondents indicated that 86.2% of teff and 49.2% of wheat produced in the year were supplied to the market. According to the survey report, all sample respondents of the two commodities were potential market suppliers during the survey period. Several variables are hypothesized to influence the volume of market supply of teff and wheat by sampled producers.

There are several determinants that influence farmers' marketable supply. Different researchers described these determinants depending on the purpose of their study and listed relevant variables to be considered. In this study the independent variables thought to have relationship with marketable supply of teff and wheat are described as sex of the household head, age of the household head, family size, quantity produced, farm size, lagged price, access to credit, access to market information, price of other crops (pepper), and access to extension service. The relationship of these variables with marketable supply of teff and wheat is discussed in the following section.

Prior to running the OLS regression model, all the hypothesized explanatory variables were checked for the existence of multi-co linearity problem. The study used Variance inflation factor (VIF) to investigate the degree of multi-collinearity among continuous explanatory variables and contingency coefficient (CC) among discrete (dummy) variables. A statistical package known as SPSS12 was employed to compute the VIF and CC values. The result of values of VIF for teff ranges from 1.563 and 1.885 and it was from 1.175 to 3.986 for wheat (see appendix table 2). Likewise, the values of CC for teff ranged from 0.708 to 0.713 and 0.092 to 0.374 for wheat (see appendix table 1). Hence, multi-co linearity was not a serious problem both among the continuous and discrete variables.

The overall goodness of fit of the regression model is measured by the coefficient of determination (R^2). It tells what proportion of the variation in the dependent variable, or regress and, is explained by the explanatory variable. R^2 lies between 0 and 1, the closer it is to 1, and the better is the fit. Hence, The overall model goodness of fit represented by model count R^2 for teff and wheat are very good that are 99.5 for teff and 84.5 for wheat indicating that 99.5% of teff and 84.5% of wheat sample households were correctly predicted out of 80 sample household heads of each commodity.

4.8.2. Econometric results of the OLS model

Estimates of the parameters of the variables expected to determine the marketable supply of teff and wheat are displayed in Table 26 and 27 respectively. For teff producers, among a total of 11 explanatory variables (8 continuous and 3 dummy) included into the econometric model only four variables were found to significantly influence marketable supply of teff positively. These are sex of the household head, quantity of teff produced, access to market information and access to extension services. The remaining seven variables were found to have no significant effect on marketable supply of teff.

Sex of the household head (SEX): since both men and women take part in production and management of crops, previously the likely sign of the coefficient of sex on sales volume was not hypothesized. However, sex of the household head influenced the marketable supply of teff positively and statistically significant at 10% significant level. The positive sign implies that if the household is male headed the probability of teff to be marketed increased by 47.6%.

This can be explained by the fact that males have relatively better labor (ME) advantage to produce and supply more volume. Secondly, males are subjected to different expenditure. The need of cash for expenditure made them to supply higher volume of teff to the market. Earlier study by Dawit (2010) also revealed that sex of the household head is one of the factors that affect the probability of marketable supply of poultry positively in Alamata and Atsbi-womberta woredas of Tigray.

Quantity of teff Produced (QUANPROD): as hypothesized the multiple linear regression output variable was significant at 1% significant level, a positive coefficient implies that an increase in quantity of teff produced increases volume of marketable supply of teff by farmers. It indicates that households who produce more quantity of teff had also supplied more to the market. The result shows that a one quintal increase in the teff production causes a 0.803 quintal increase in the volume of marketable supply of teff. This is in agreement with previous studies conducted by Wolday (1994), Wolelaw (2005), Rehima (2006), Kindie (2007), Bosena (2008), and Assefa (2009) found that the amount of grain, rice, red pepper, sesame, cotton and honey respectively, produced by household affected marketable supply of each of the commodities significantly and positively.

Table 26 OLS estimation results of determinants of teff market supply

Variables	Coefficient	Standard error	t-ratio	P - value
Constant	-2.365	1.801	-1.313	0.201
SEX	0.476	0.238	1.999	0.057*
AGE	0.009	0.011	0.833	0.413
EDU-LEV	0.035	0.034	1.041	0.308
FAMISIZE	0.052	0.067	0.770	0.419
FARMSIZE	0.173	0.188	0.919	0.367
QUANPROD	0.803	0.050	15. 967	0.000***
PRLAGGED	0.004	0.004	0.887	0.384
HOR-PRC	-0.010	0.017	-0.588	0.575
CRD-ACSS	-0.088	0.271	0.326	0.747
ACCMKINF	0.504	0.239	2.106	0.046**
EXT-ACCS	0.424	0.227	1.870	0.074*

Dependent variable amount of teff sold in quintal. N=80 R^2=99.5 Adj. R^2=99.3

***, **, and * show the value statistically significant at 1%, 5% and 10% respectively.

Source survey result 2008

Access to market information (ACCMKINF): market information access is also another factor, which positively affects quantity supply of teff at 5% significance level. The positive and significant relationship between variables indicate that as farmers accessed market information, the quantity of teff sold at market also increases. The coefficient also confirmed that accessing market information to farmers will tend to increase the marketable supply of teff by 0.504 quintals. The implication is that obtaining and verifying information helps to supply more quantity of teff.

Access to extension (EXT-ACCS); Result of the finding indicated that access to extension service was positively and significantly related to the volume of teff supplied to the market at 10% significance level. On average, if a teff producer gets extension contact the amount of teff supplied to the market increases by 0.424 quintal. This suggests that access to extension service avails information regarding technology which improves production that affects the marketable surplus. The result of this study goes along with the findings of many authors. For instance, Yishak (2005), Rehima (2006), and Rahmeto (2007) found that access to extension service on improved maize seed, red pepper and improved haricot bean respectively affected marketable supply of each of the commodities significantly and positively.

Similarly the hypothesized explanatory variables that were expected to influence volume of marketable supply of teff in the study area were also expected to influence the volume of marketable supply of wheat. However, of the total eleven (8 continuous and 3 dummy) variables only three variables affected the volume of marketable supply of wheat. These are quantity produced wheat, price of other crops (pepper) and access to credit. Table 16 clearly depicted OLS estimates of wheat explanatory variables including the significant ones.

Quantity of wheat produced (QUANPROD); one of the important variables hypothesized to affect volume of marketable supply of wheat in the study area and it was found to influence the volume of wheat supplied to the market positively and significantly at less than 1% probability level. A positive coefficient implies that an increase in quantity of wheat produced increases volume of marketable supply of wheat by farmers. It indicates that households who produce more quantity of wheat had also supplied more to the market. The result shows that a one quintal increase in the wheat production causes a 0.646 quintal increase in the volume of

marketable supply of wheat. This is also in agreement with previous studies conducted by Wolday (1994), Wolelaw (2005), Rehima (2006), Kindie (2007), Bosena (2008), and Assefa (2009), which found that the amount of grain, rice, red pepper, sesame, cotton and honey, respectively, produced by household affected marketable supply of each of the commodities significantly and positively.

Access to credit (CRD-ACSS): As the multiple regression model result indicates, the variable access to credit had positive and significant influence on volume of wheat supply at 5% significance level. From this result it can be stated that those farmers who have access to formal credit, are more probable to supply marketable wheat than those who have no access to formal credit. In the study area, access to credit is determined by availability of cash on hand. As indicated in the descriptive part, the agricultural Office that distributes improved seed and fertilizer on credit requires a down payment to provide credit. In this case, only those farmers who possess cash on hand can benefit from formal credit. On the other hand, farmers who have no cash on hand will be devoid of the opportunity. Earlier study also reveals that credit is one of factors that affect the probability of adoption of improved varieties, the quantity of fertilizer farmers apply and haricot bean respectively (Legesse, 1992; Tesfaye and Shiferaw, 2001 and Rahmeto, 2007).

Table 27 OLS estimation result of determinants of wheat market supply

Variables	Coefficient	Standard error	t-ratio	P – value
Constant	2.244	4.809	0.467	0.643
SEX	-0.290	1.498	-0.194	0.847
AGE	-0.006	0.050	-0.126	0.900
EDU-LEV	0.151	0.219	0.689	0.494
FAMISIZE	-0.043	0.263	-0.161	0.872
FARMSIZE	0.030	0.424	0.071	0.943
QUANPROD	0.646	0.056	11.596	0.000***
PRLAGGED	0.014	0.013	1.086	0.283
HOR-PRC	-0.016	0.009	-1.704	0.095*
CRD-ACSS	4.466	1.766	2.529	0.015**
ACCMKINF	1.967	2.281	0.863	0.393
EXT-ACCS	0.672	1.091	0.616	0.541

Dependent variable amount of wheat sold in quintal. N=80 R^2=84.5 Adj. R^2=81.6

***, **, and * show the value statistically significant at 1%, 5% and 10% respectively.

Source survey result 2008

Price of other crops (HOR-PRC): Here price of pepper was taken for comparison since it is the predominant cash and competent substitute crop grown in the study area. As hypothesized previously price of pepper influenced volume of wheat marketed negatively and significantly at 10% level of significance. The implication is that the increase in price of pepper by one birr reduces marketable supply of wheat by 0.016 quintal. The increase price of other crops (pepper) made producers to shift and engage in the production of pepper that have better price.

5. CONCLUSION AND RECOMMENDATION

5.1.Summary and conclusion

The study was conducted in Halaba special woreda located about 315 km in South of Addis Ababa. The area is known for its surplus production of agricultural commodities. However, analysis of market chain of agricultural crops in general and teff and wheat in particular are not well understood. The study attempted to investigate marketing chain of teff and wheat in the area. Selection of the two crops was mainly based on their relative importance and marketability.

The study was conducted in order to identify production and marketing support services, structure-conduct-performance of the market, determinants of supply of teff and wheat in the area.

Production of teff and wheat in the study area is mainly for market. Hence, the commodities are important source of cash for smallholder farmes', following red pepper. Nationally, the area is known for its surplus production. In the area, the average land allocated for the production of teff and wheat per household was 0.83 and 0.67 hectares respectively. The respective average production of teff and wheat per hectare was 7.63 and 19.05 quintals.

During the survey, it was observed that majority of respondents do not clearly know the appropriate fertilizer and seed rate. Although fertilizer plays important role in increasing production and productivity of agricultural crops, its application rate by sample respondents was below the research recommendation. The average quantity of rate of DAP fertilizer applied for the production of teff and wheat was 54.5 and 86.8 kg per hectare respectively. However, the application rate ranged from 16 kg to 100 kg per hectare for teff and 33.33 kg to 200 kg per hectare for the production of wheat. The average application rate of UREA fertilizer was 8.39 kg for teff and 18.33 kg for wheat, per hectare. The rate of application of UREA by sample respondents ranged from 0 to 50 kg for teff and 0 to 100 kg for wheat production, per hectare. On the other hand, 63.75% of teff and 77.5% of wheat sample respondents did not use UREA fertilizer at all. The wider range of fertilizer rate application

requires serious attention. Some of the reasons for sample respondents to deviate from the recommended rate of fertilizer were partly due to poor extension service and lack of financial capacity of farmers to apply the fertilizer in accordance with the recommended rate.

In the study area, during the year under the study, out of the total teff and wheat produced by sample farmers 86.2 % (80,308 quintals) of teff and 49.2% (35,107 quintals) of wheat were supplied to the market. The remaining 13.8% of teff and 50.8% of wheat hold by farmers for consumption, repayment for borrowed seed and as source of seed for the next production year.

The estimated farmers average production cost per hectare was 1428.58 ETB for teff and 2096.32 ETB for wheat. The major costs incurred by the farmers in the study area in order of importance for the production of teff were 21.4 % for land rent, 20.2% for fertilizer purchase and 10.6% for oxen rent. Likewise, the costs incurred for the production of wheat in order of importance were 21.4% for seed purchase, 19.2% for fertilizer purchase and 15.1% for land rent. The average profitability of farmers per hectare from production of teff and wheat was 1511.81 and 3063.18 ETB respectively.

Rain failure, higher cost of fertilizer and delayed delivery, soil erosion, labor shortage, lack of credit access, draft power, and prevalence of crop disease were some of the production problems faced by farmers. Besides, unfair pricing and weighing, lack of institutions providing market information, multiple taxes, high input prices and chemical herbicide adulteration were farmers marketing problems.

The study also identified the main marketing agents through whom teff and wheat were channeled from producer to final consumers, such as farmer traders, urban assemblers, wholesalers, regional retailers, urban retailers, cooperatives, and NGOs. Accordingly, teff sample producers supplied 40% (32, 123.2 quintals) of their produce to urban assemblers, 37.4% (30,035.2 quintals) to wholesalers, and 16.5% (13,250.8 quintals) to regional retailers. Similarly, wheat producers supplied 45.1% (15,833.3 quintals) of their produce to wholesalers, and 43.8% (15,376.9 quintals) to urban assemblers.

Regarding structure of the market, the four firms concentration ratio (CR4), that is the share of the largest four wholesale traders in the total volume of teff and wheat purchased at Alaba Qulito regional market, hold 65% and 71.5% of the total volume of teff and wheat purchased respectively, in the year 2007/08, indicating that Alaba Qulito regional market has strong oligopolistic market structure.

Barrier to entry in terms of licensing and years of trade experience did not hinder entry into teff and wheat market, but capital requirement did. Market information system is not transparent among farmers and traders. However, all traders have information from different informal sources.

Concerning conduct of teff and wheat market, generally, trading is mainly on eye-appraisal and exchange takes place on bargaining. Traders are highly mobile and purchased from different market per week. The average number of market visited per week by all traders was 1.43. The frequency of market visit by urban assemblers (2.25) was the highest of all traders followed by wholesalers (1.58).

The result of marketing costs, margins, and profitability analysis indicated that farmer traders incurred the smallest transaction cost per quintal. This was due to absence of costs related to transportation since they sale the product in their village market. The average transaction cost per quintal incurred by wholesalers of teff (29.94 ETB) and wheat (23.6ETB) was higher than any other traders. This could be due to higher costs associated with transportation of the product and storage loss during product preparation. With respect to profitability, urban retailers received the highest net profit rate per quintal 20.35 ETB for teff and 28 ETB for wheat. Wheat urban assemblers and teff regional wholesalers obtained lowest net profit per quintal respectively due to higher transaction cost for the later associated with product preparation and transportation. However, wholesalers' lower net profit per quintal could be compensated through transaction of higher volume of the commodities.

Capital shortage, lack of credit access, poor product quality, lack of market information, market infrastructure, multiple taxation, transportation cost, lack of demand and unfair competition with unlicensed traders were some of marketing problems faced by traders.

Results of econometric model indicated the relative influence of determinants of different variables on marketable supply of teff and wheat in the study area. A total of eleven (8 continuous and 3 discrete) explanatory variables were included in the model for both teff and wheat independently. Of the total 11 variables, four variables of the teff and three variables of the wheat had shown significant relationship with marketable supply of teff and wheat. Accordingly, quantity of teff produced, access to market information, access to extension and sex of the household head were found to have positive and significant influence on marketable supply of teff. Likewise, quantity of wheat produced, and access to credit were found to influence marketable supply of wheat positively and significantly. Contrary to this, price of other crop (pepper) had shown negative and significant relationship with volume of wheat marketed.

5.2. Recommendation and policy implication

Contribution of teff and wheat to household's nutrition, income and food security is tremendous. It also provides job opportunities for youth and the landless and for traders and poor urban dwellers engaged in its processing activities. Regardless of its contribution, however, its production and productivity is still low compared to world and regional average. As a result, institutional support provided to the sector such as access to credit, market information and extension services were below the expected level. These factors together with several household personal, demographic and socio-economic factors greatly affected the marketable supply of teff and wheat and consequently the production and productivity of the sector. Based on the research findings of this study, the following points are recommended to improve marketing chains of teff and wheat so as to enhance its production and productivity.

The wider range difference among farmers in rate of fertilizer application and seeding rate per hectare and its deviation from recommended rate was found partly due to poor extension services as well as lack of financial capacity of farmers to apply fertilizer according to recommendation. Therefore, provision of extension service has to be strengthened so as to improve farmers' access to information and extension advices through giving training and other related supports. Moreover, improving access to credit and reconsidering the existing

bureaucratic input administration procedure are also crucial to allow easy access to promote investment and trade. Furthermore, revisiting the previous research recommendations is highly important.

In addition to this as discussed in the descriptive part of the study larger numbers of farmers have reported the existence of disease problem in the study area. The presence of crop diseases created frequent yield reduction of the sector and it affected the efficiency of production and hampered the supply development. In order to avoid the frequent reduction in output and increase supply, in short run, major diseases should be controlled by strengthening the present crop protection services through availing important chemicals required to prevent the disease at reasonable price. In the long run, development of high yielding and disease resistant varieties is a solution to the prevalence of crop disease.

The enhancement of teff and wheat producers' bargaining power through cooperatives is the best measure that should target at reducing the oligopolistic market structure in the Alaba Qulito regional market. The measure also favors the sustainable supply of teff and wheat at reasonable price to consumers.

Quantity of teff and wheat produced is one of the determinant factors that affect volume of teff and wheat supplied to the market positively. Therefore, policy proposed should focus on increasing production and productivity of the sector. This could be partly achieved through identifying new technologies and management systems that would improve the production and productivity of the crops. Creating stable demand for surplus production would also enhance farmers' decision on teff and wheat production consistently.

The result of this study has shown that access to market information affected the quantity of teff supplied positively and significantly. Farmers in the study area do not get timely market information up on which to base their marketing decision. They depend on traders and other farmer friends for price information. Therefore, there has to be an institution that can convey reliable and timely market information required by all stakeholders simultaneously. This would make the marketing system to operate efficiently and harmoniously. The availability of timely and precise market information increases producers' bargaining capacity to negotiate with buyers of their produce. In order to obtain this advantage there is a need to

improve extension system which focused on market extension and linkage of farmers with markets is necessary to ensure a reliable market outlet for producers of the study area.

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7. APPENDIX

Appendix Table 1 Contingency coefficient of wheat/teff dummy variables

Variables	Credit access	Access to price information	Sex of HHH	Access to extension
Credit access	1 (1)			
Access to price information	0.092 (0.712)	1 (1)		
Sex of HHH	0.141 (0.708)	0.294 (0.708)	1 (1)	
Access to extension	0.374 (0.710)	0.172 (0.713)	0.269 (0.711)	1 (1)

Figures in parenthesis indicate contingency coefficient of teff sample respondent

Source own survey data computation 2008

Appendix Table 2 Multi-collinearity test result for continuous variables

No	Variables	Collinearity statistics for Wheat		Collinearity statistics for Teff	
		Tolerance	VIF	Tolerance	VIF
	Constant				
1	Lagged wheat/teff price	0.640	1.563	0.772	1.295
2	Education level of HHH	0.625	1.601	0.762	1.313
3	Family size of HHH	0.745	1.341	0.256	3.907
4	Farm size of HHH (ha)	0.530	1.885	0.251	3.986
5	Amount of wheat produced (qt)	0.551	1.814	0.851	1.175
6	Price of other crop (pepper)	0.620	1.613	0.736	1.359
8	Age of HHH	0.608	1.644	0.698	1.432

Source own survey data 2008

Appendix Table 3 Conversion factors used to estimate man equivalent

Age group	Male	Female
<10	0	0
10-13	0.2	0.2
14-16	0.5	0.4
17-60	1	0.8
>60	0.7	0.5

Source Bekele Hundie 2001

Appendix Table 4 Conversion factors used to compute tropical livestock units

Animal category	TLU
Calf	0.25
Weaned calf	0.34
Heifer	0.75
Cow or ox	1
Horse/mule	1.1
Donkey adult	0.70
Donkey young	0.35
Camel	1.25
Sheep or goat adult	0.13
Sheep or goat young	0.06
Chicken	0.013
Bull	0.75

Source Storck *et al*...1991

Appendix Table 5, average cultivated land owned and its purpose of allocation (ha)

Land allocation	Teff growers N=80		Wheat growers N=80	
	Mean allocation	Percent allocation	Mean allocation	Percent allocation
Cultivable land	2.61 (1.31)	100	2.96 (1.22)	100
Land for maize	(0.34)	31	(0.31)	30.4
Land for teff	(0.61)	32	(0.35)	16.4
Land for wheat	(0.07)	0.77	(0.39)	25.1
Land for millet	(0.11)	5	(0.1)	4.1
Land for red pepper	(0.19)	5	(0.44)	14.5
Land for potato	(0.22)	0.4	(0.05)	0.39
Land for haricot bean	0.43 (0.44)	16.5	0.15 (0.22)	5.5

Numbers in parenthesis represent standard deviation, N= total sample size
Source own survey result 2008

Appendix Table 6, farmers input source and mode of payment during purchase (2007)

Items	Input sources	Number of sample HHs	% of sample respondent	Mode of payment (%)		
				Cash	Credit	Other
Fertilizer For teff production	Market	45	56.25	56.25	*	*
	Cooperatives	13	16.25	6.25	10	*
	WOARD	22	27.5	27.5	*	*
	Other	*	*	*	*	*
	Total	80	100	90	10	*
Teff Seeds	Market	51	63.75	63.75	*	*
	Cooperatives	4	5	3.75	1.25	*
	WOARD	6	7.5	7.5	*	*
	Own	19	23.75	*	*	23.75
	Total	80	100	75	1.25	23.75
Fertilizer for wheat	Market	53	66.25	66.25	*	*
	Cooperatives	3	3.75	3.75	*	*
	WOARD	24	30	30	*	*
	Others	*	*	*	*	*
	Total	80	100	100	*	*
Wheat Seeds	Market	30	37.5	37.5	*	*
	Cooperatives	12	15	6.25	8.75	*
	WOARD	9	11.25	11.25	*	*
	Own	29	36.25	*	*	36.25
	Total	80	100	55	8.75	36.25

Source – survey result 2008, * indicate nil (zero)